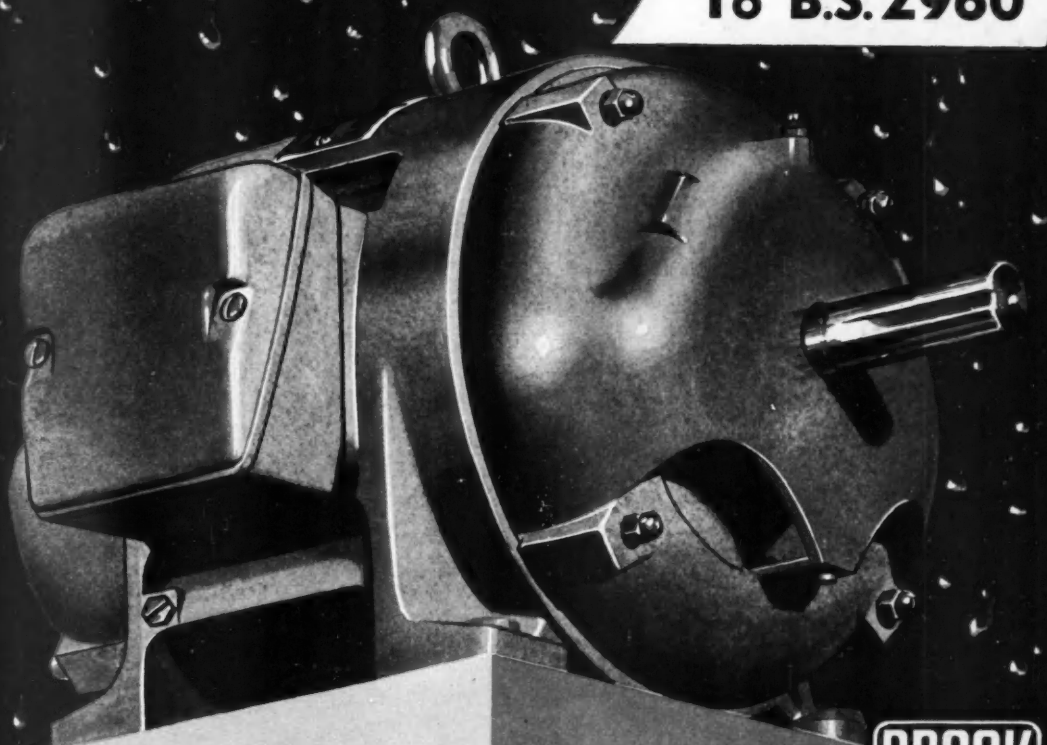
ELECTRICAL REVIEW

23 MAY 1958

New **BROOK**

To B.S.2960



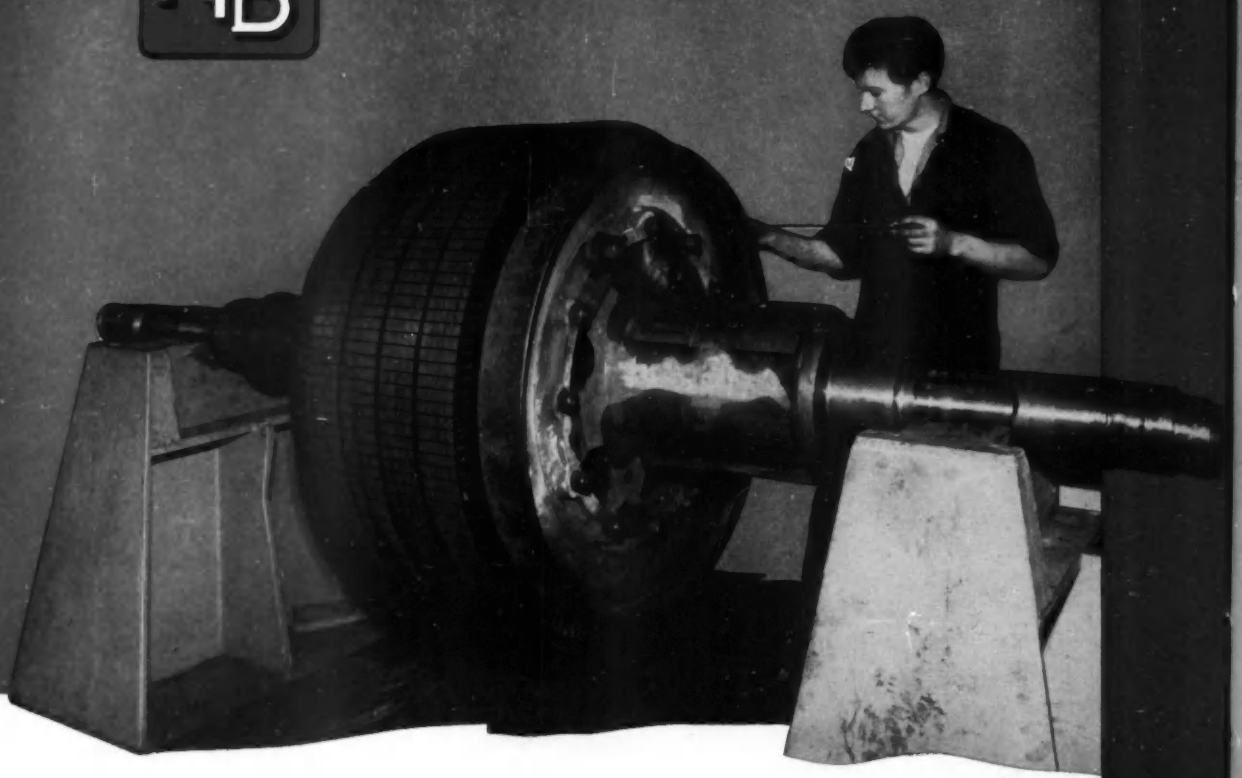
More compact • lower cost

BROOK MOTORS *Ltd*

WRITE FOR LIST 851

RTB

Completed main exciter armature core for a 200 M.W. turbo-generator made by C. A. Parsons & Co. Ltd. for Toronto.



The core of a fine generator– with laminations by RTB

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LAMINATIONS of all types, in all sizes and in all grades of materials.

FERROSIL hot-rolled and cold-reduced electrical sheet and strip, and hot-rolled transformer sheet.

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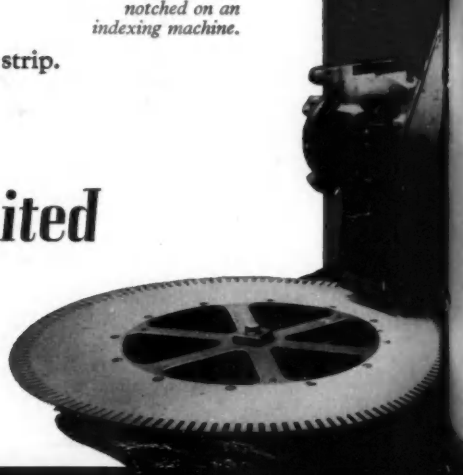
One of the laminations being notched on an indexing machine.



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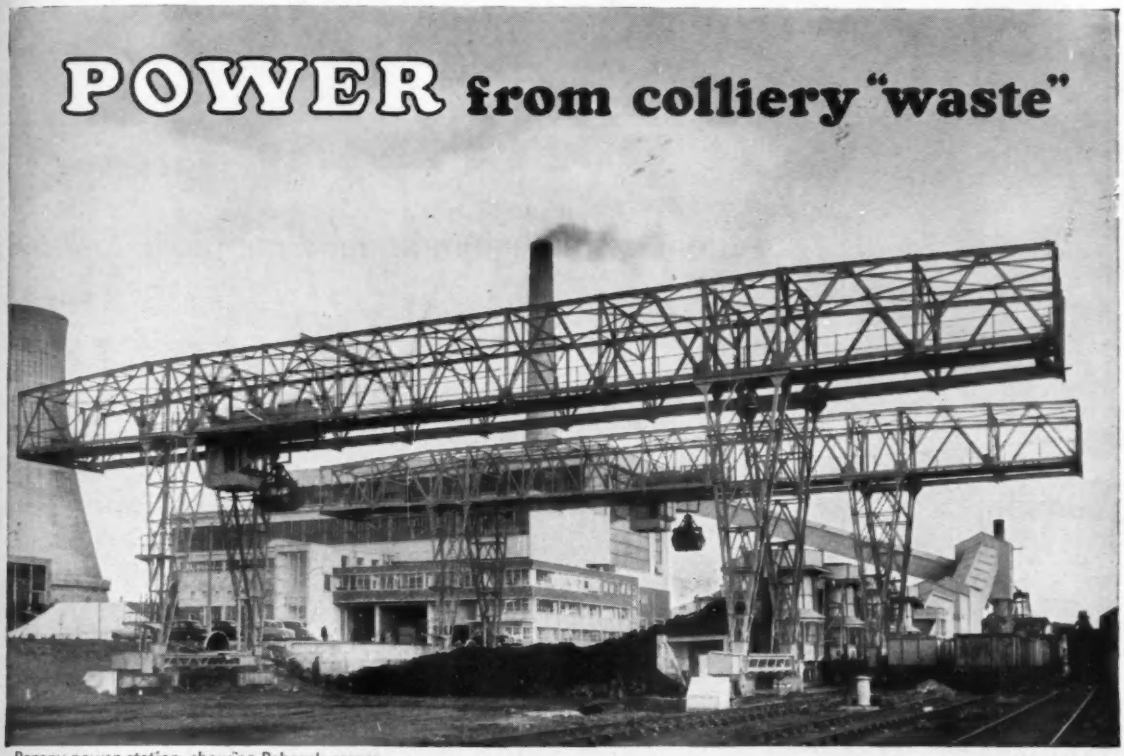
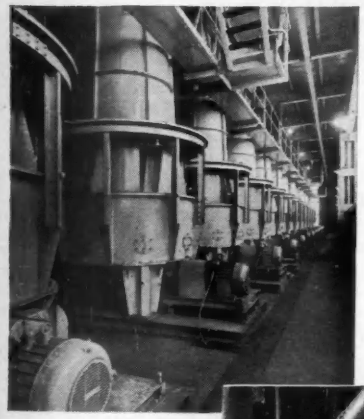
Our Cookley Works is one of the largest in Europe specializing in the manufacture of laminations for the electrical industry.

POWER from colliery "waste"



Barony power station, showing Babcock cranes, rotary hoppers and fuel conveyor system.

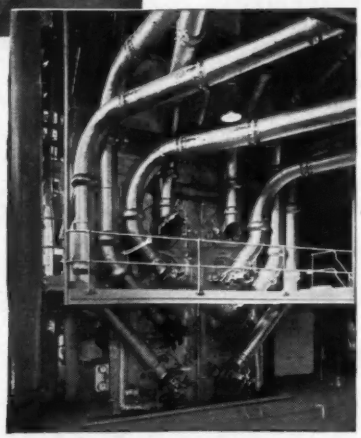


Line of Babcock rotary hoppers for handling slurry to the drying and pulverizing mills feeding the boilers.

The whole of the boiler plant for the new Barony power station (South of Scotland Electricity Board), comprising four 150,000 lb./hr. pulverized-coal-fired boilers, and the whole of the coal and ash handling equipment, are of BABCOCK design and manufacture.

Outstanding feature of this installation is its ability to use as fuel, "washery-slurry"— a wet, putty-like and previously unusable by-product of the coal-washing plants.

This has been made possible through the development by Babcock & Wilcox of new, economic methods and equipment for the handling and preparation of "washery-slurry" for use as a boiler fuel — one of many BABCOCK contributions to national fuel economy.



P.F. burners and fuel piping on one of the boilers.

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STEAM-RAISING PLANT
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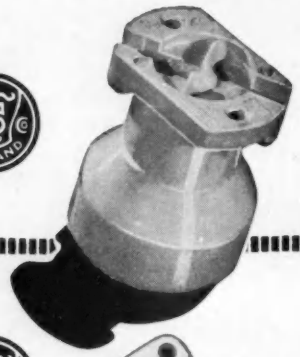
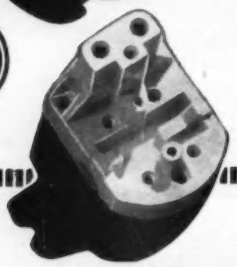
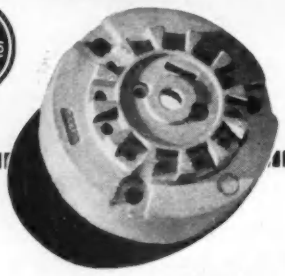


porcelain



die-pressed

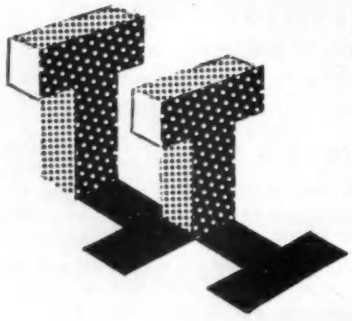


insulators

Our long experience as manufacturers of die-pressed porcelains for all electrical accessories is at your service.

The 'T.T.' Trade mark is a safeguard of good quality for all electro-ceramics, whether H.V. or L.V. insulators, refractories for electrical heating elements, H.F. ceramics etc., etc.

We would also remind you that "FISH SPINE" insulating beads are still the highest quality and most accurate beads available.



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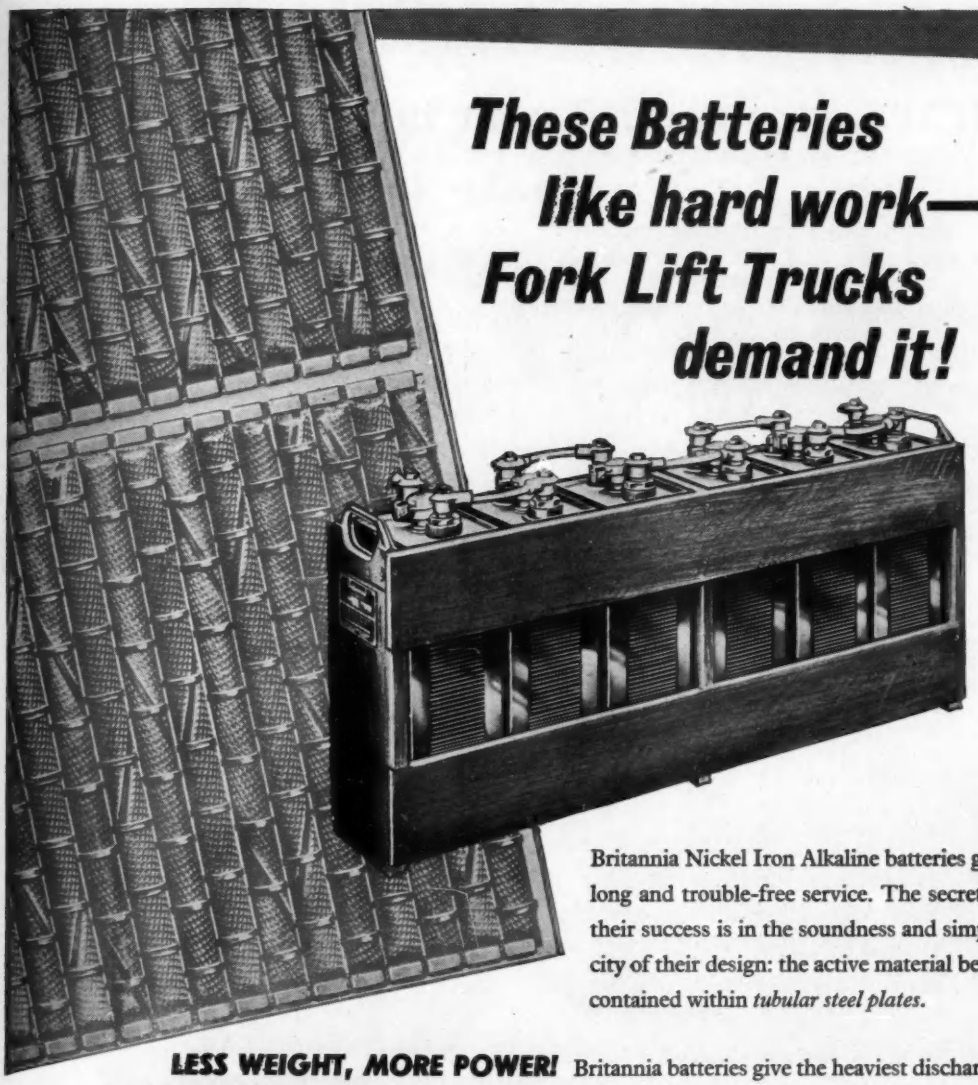

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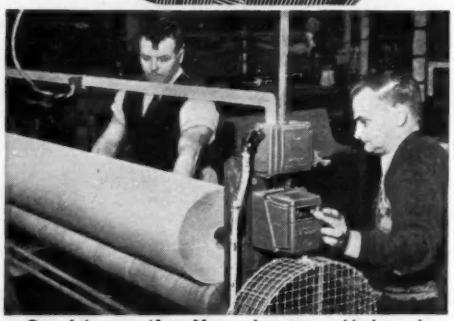

One of the many 'Auto-Memota' starters and isolators in St. Margaret's Mills, Leicester.

MEM MIDLAND ELECTRIC MANUFACTURING CO. LTD · TYSELEY · BIRMINGHAM 11

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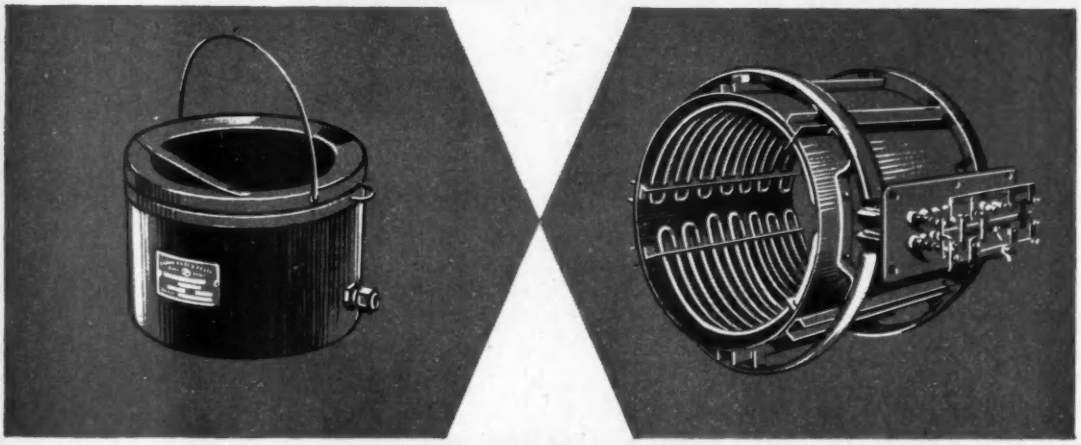
Electric heating generated and applied locally offers the advantages of simplicity, speed, efficiency and economy in hundreds of industrial processes, large and small. Five basic types of BTH 'Pyrobar' electric heater are available to deal with almost any application. Built to exacting standards, they are virtually indestructible in service. Standard shapes and sizes are delivered from stock, or special heaters can be formed during manufacture to almost any desired shape. Alternatively 'Pyrobar' heaters can be supplied in straight lengths, and bent cold on site to suit the application.



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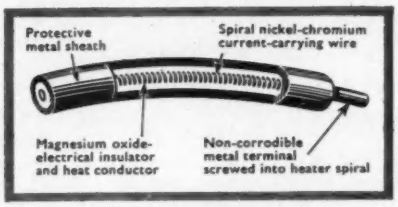
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Spiral nickel-chromium current-carrying wire
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Non-corrodible metal terminal screwed into heater spiral

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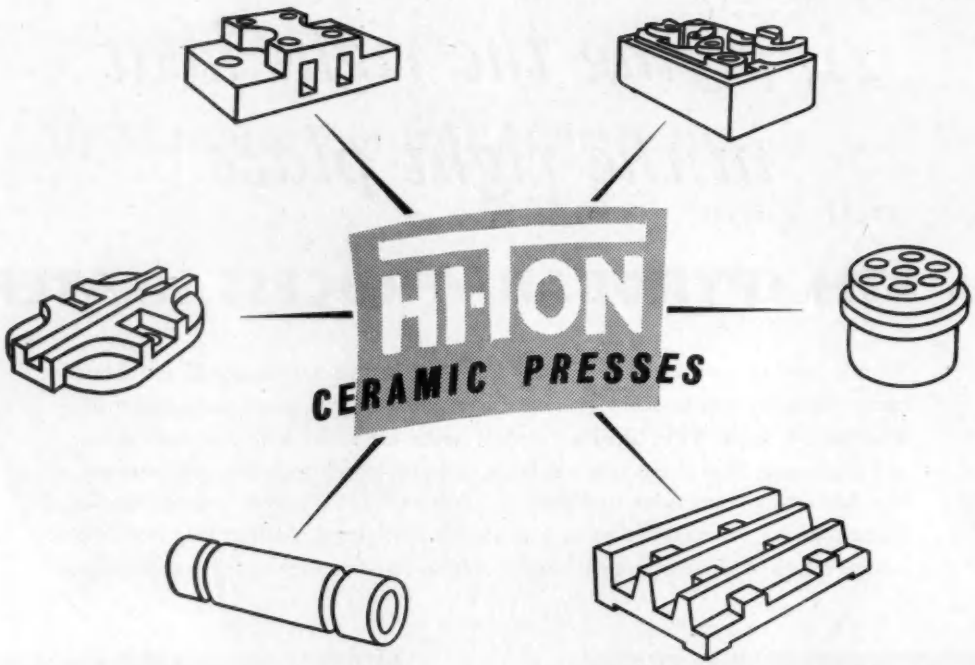

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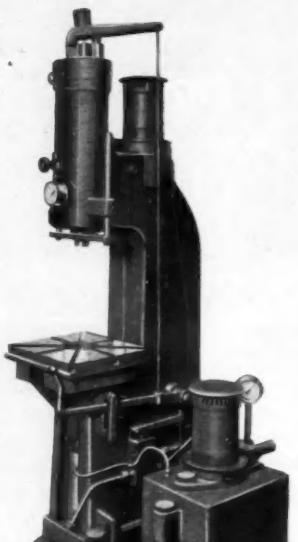
For precision operation, sensitive finger-tip or toe control, consistent production and minimum maintenance, the HI-TON hydraulic presses are unrivalled. The 12 Ton model with 7 ton ejector specially designed for the ceramic industry has been installed extensively enabling users to obtain highest production and dimensional precision on a great variety of die pressed products. The HI-TON Ceramic Press is undoubtedly the machine for combining economy with productive efficiency and we shall be pleased to send further particulars to interested engineers.

HI-TON Hydraulic Presses are made in a wide range of sizes. There are Bench models 2-6 tons, Pedestal models 6-100 tons and heavy duty machines up to 500 tons, as well as automatic hydraulic indexing presses, riveters and croppers. Hi-Ton Machine Tools Ltd., also design and build special purpose machine tools of all types to meet customers, particular requirements.



12 Ton HI-TON Ceramic Press with 7 ton ejector

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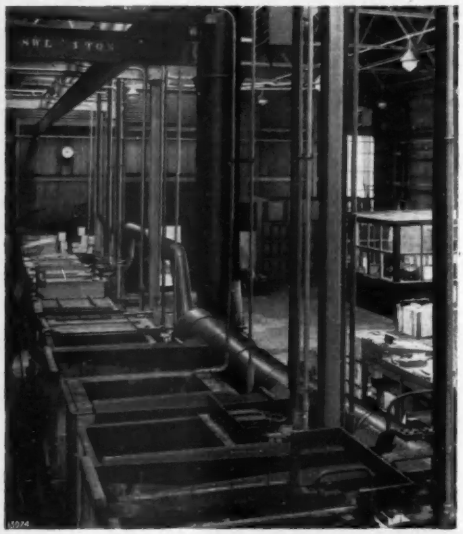

The illustration shows Sturtevant Fume Extraction Equipment on Pre-Treatment Baths of the Kanigen Plating Plant at the Oldbury Works of Albright & Wilson (Mfg.) Limited. The hoods and ducting are made in P.V.C. and all parts of the fan coming into contact with the fumes are protected by P.V.C.

in the removal of

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and

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FUMES

Extensive experience in the design and application of many types of process exhaust plants enables us to bring the widest technical "know-how" to bear on each fume problem. Sturtevant plants are therefore highly efficient, economical in operation, and require the minimum of attention and maintenance.

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Flying Repairs. Repairs from overseas are not infrequent at the house of Collins. The above photograph shows two rotors, which had just arrived by air from the Middle East, being unpacked. A few days later they were again in B.O.A.C.'s charge on their urgent way back to another satisfied customer.

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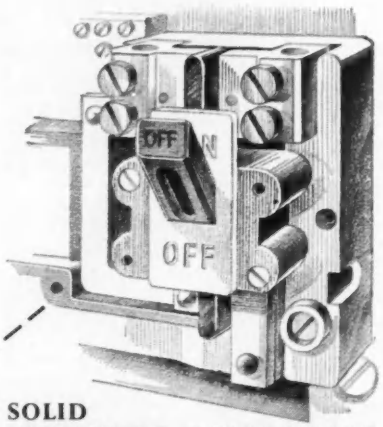
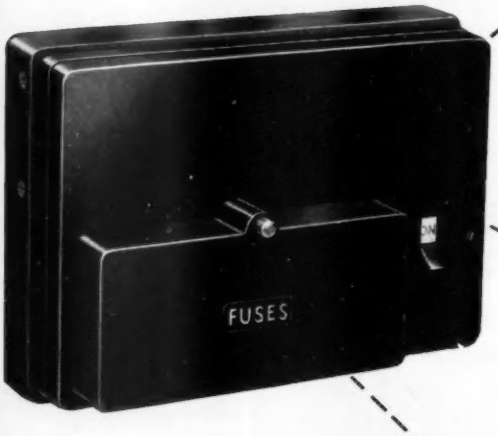
3 of the many points about Wylex Fuse Units which customers specially like...



SOLID PERMANENT CONNECTIONS

We could have used cables to link the bus bar and neutral bar to the Switch. This would have cut cost a few pence, but it would also have cut efficiency. We aim at low losses with the Wylex Unit. So we made the links solid.

The switch, too, is an example of Wylex thoroughness. It is not the standard 60 amp. Wylex switch — but one specially adapted to suit the fuse unit assembly.



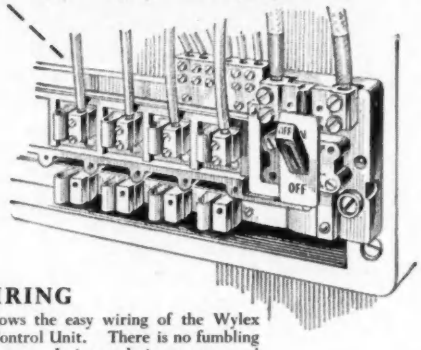
CIRCUIT IDENTIFICATION

Your Electrician writes the circuit details in pencil on the inside of the Wylex Fuse Unit Cover. This has a special surface which takes pencil writing easily and legibly. It is a Wylex patent.

WYLEX

SWITCH FUSE CONTROL UNITS

Made in 1, 2, 3, 4, 6, 8 Way. Rewirable or H.R.C. Cartridge. All-Insulated (Brown or Cream) or Metalclad (Brown only).



EASY WIRING

The sketch shows the easy wiring of the Wylex Switch Fuse Control Unit. There is no fumbling in awkward corners. It is a real time saver; and its neatness satisfies the most fastidious.

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industry

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- Large easily controlled oven with heat indicator.
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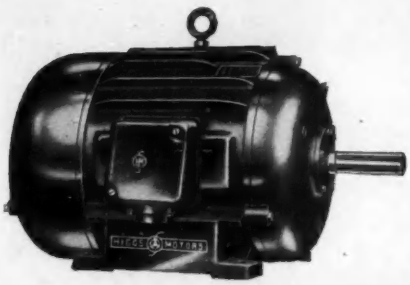

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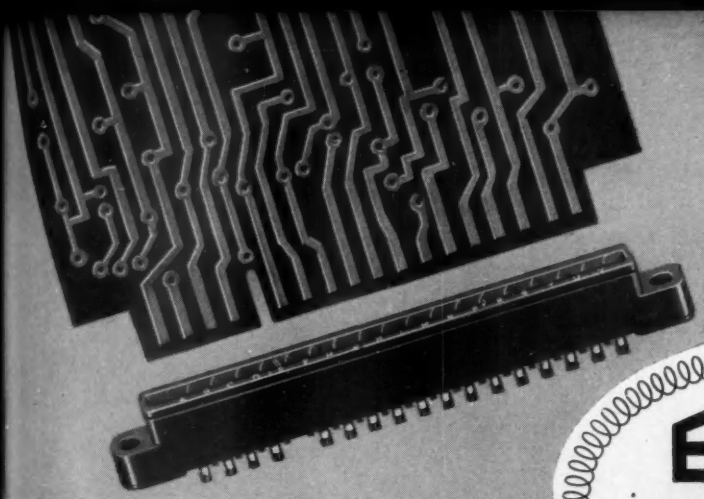

This K-18 connector is ACTUAL SIZE —made under U.S. licence from Winchester Electronics Inc.

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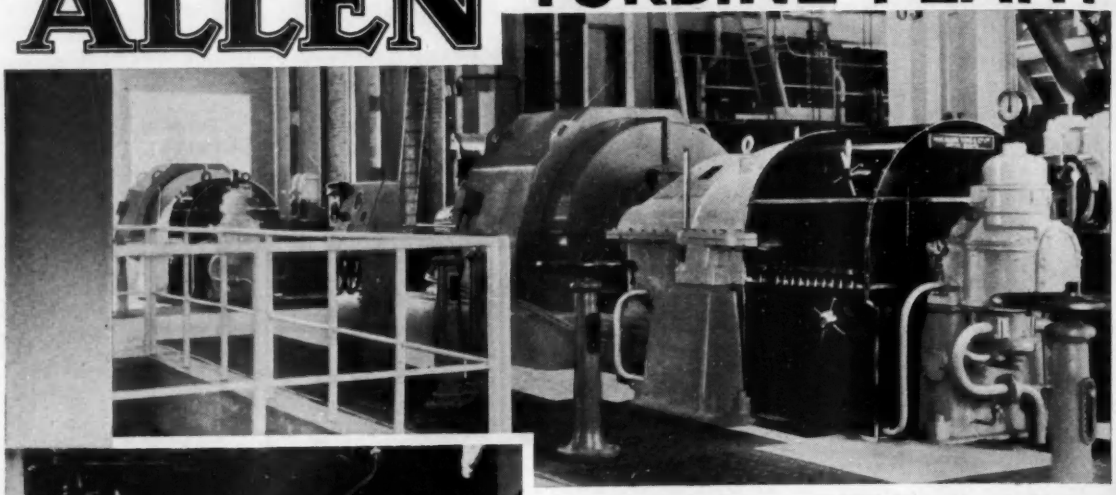

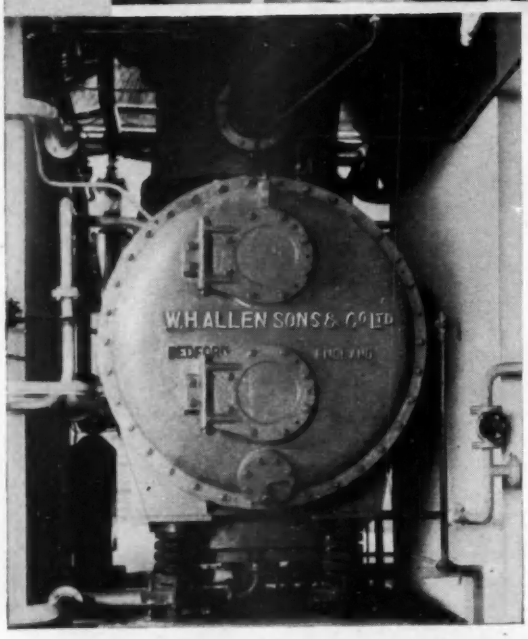

ULAN POWER STATION

of the

ELECTRICITY COMMISSION of NEW SOUTH WALES

The new Ulan power station, which supplies electricity for the Ulan County Council distribution area and surplus energy to the grid, is equipped with two ALLEN steam turbines and associated plant, shown in the illustrations.

Each set comprises a single-cylinder, multi-stage condensing turbine driving through speed-reduction gears, a totally enclosed water-cooled Mather & Platt alternator, designed for a continuous full-load output of 3,125 kW at 11,000 volts, 0.8 power factor, 3 phase, 50 cycles, running at a speed of 1,500 r.p.m.

The turbines, which run at 5,000 r.p.m. and operate on steam at 400 p.s.i.g. and 750 deg. F., have two bled steam points, the first providing steam for an evaporator, and the second connected to a feed heater to raise the condensate temperature on return to the feed-water system.

Consulting Engineers: Donoghue & Carter, Sydney

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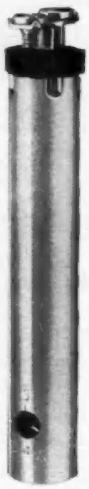

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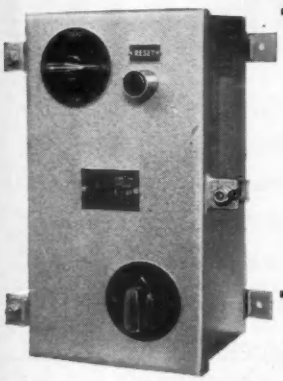

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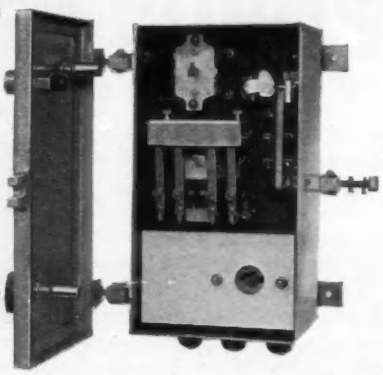

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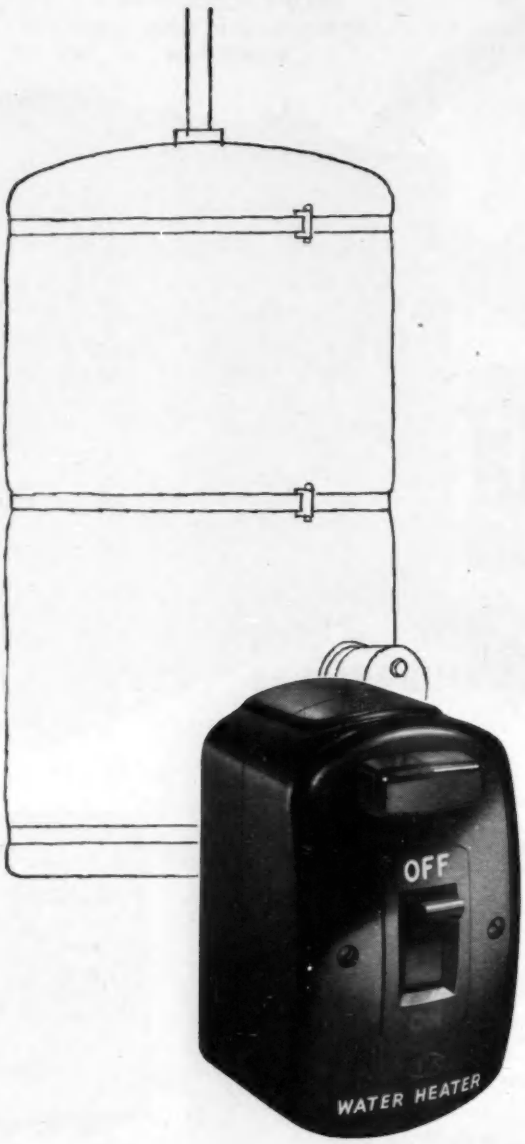

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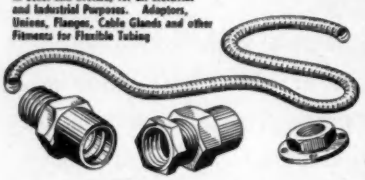

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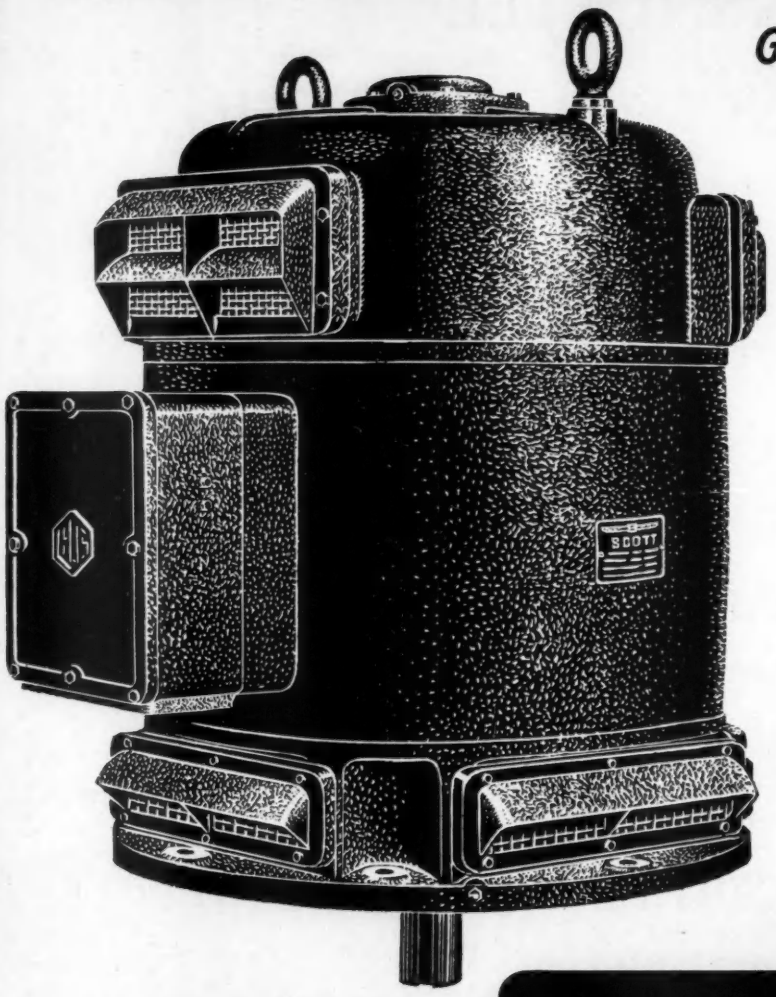

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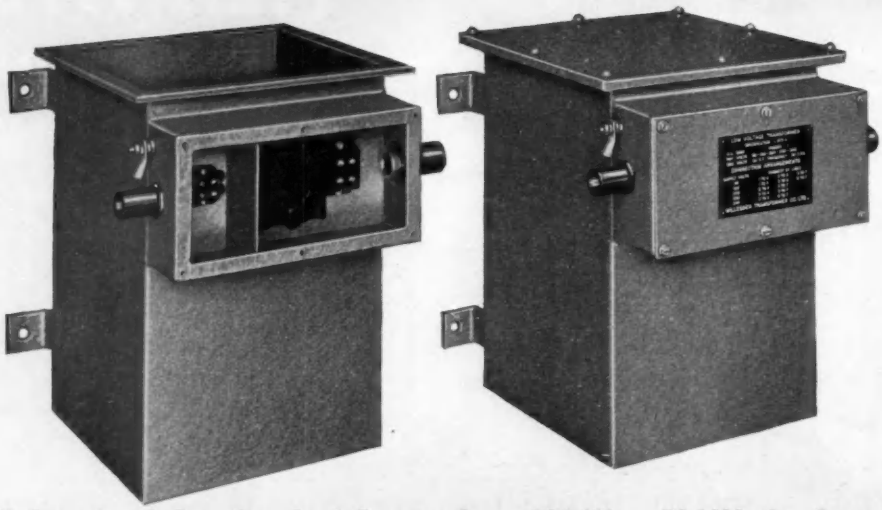

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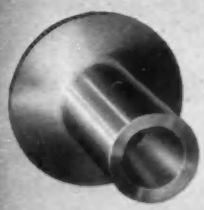

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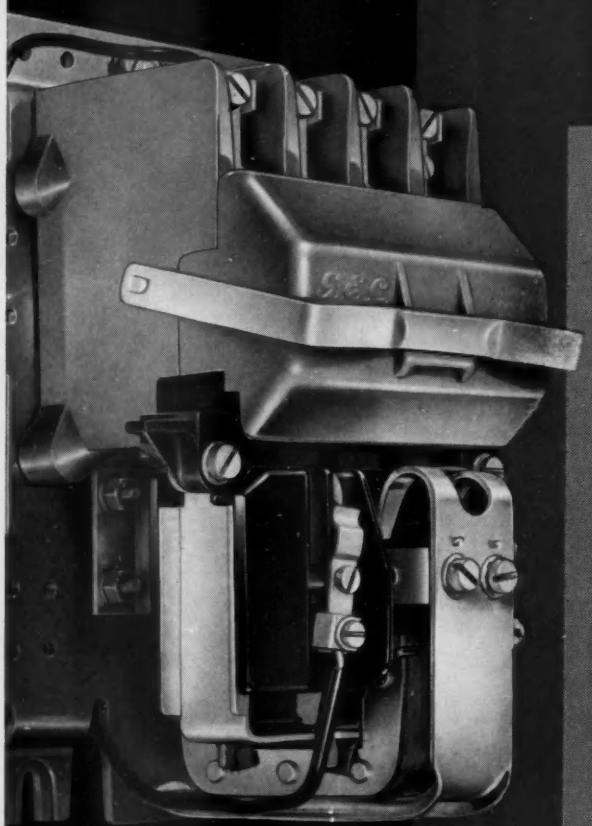

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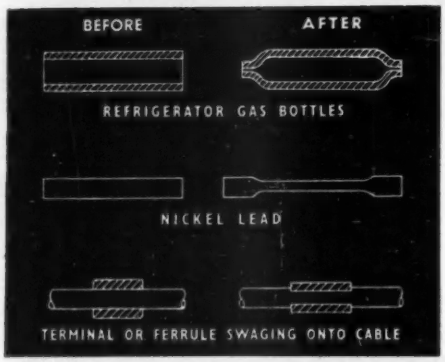

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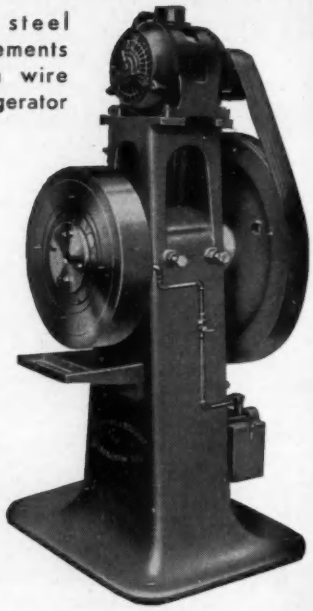

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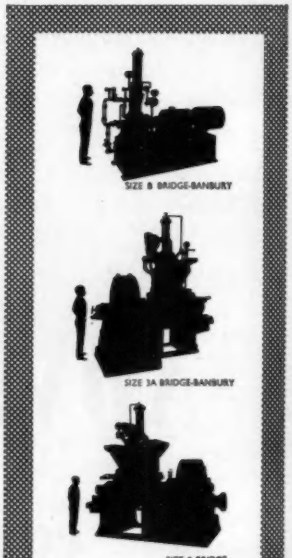

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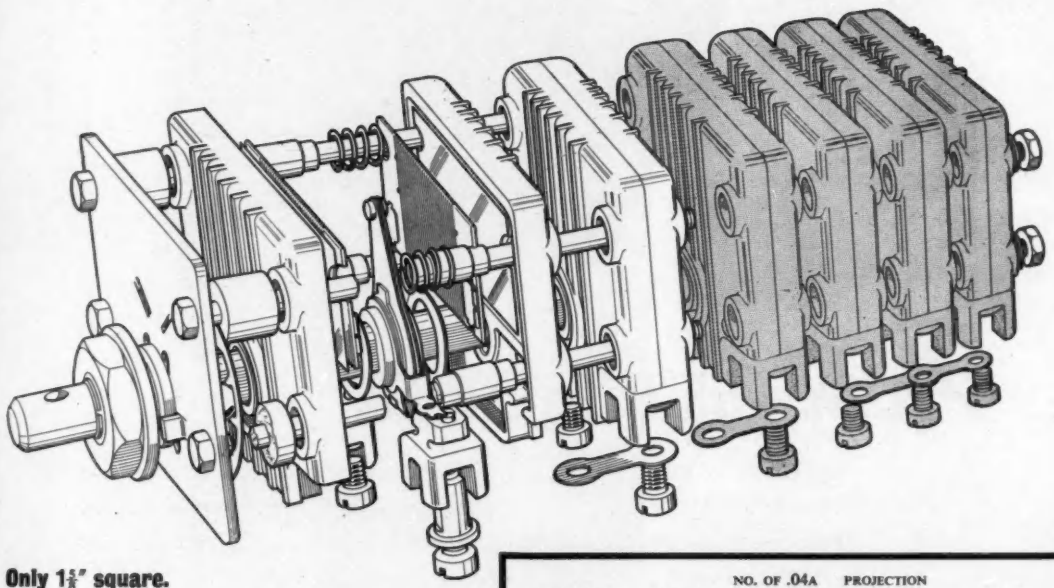

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100	1	11 — 16	1.175	80/10/0941
75	2	17 — 23	1.575	80/10/0926
50	2	24 — 31	1.575	80/10/0935
33	3	32 — 50	2.075	80/10/0942
2 × 600	2	2 × 2	1.575	80/10/0949
2 × 300	2	2 × 3 — 5	1.575	80/10/0947
2 × 150	2	2 × 6 — 10	1.575	80/10/0936
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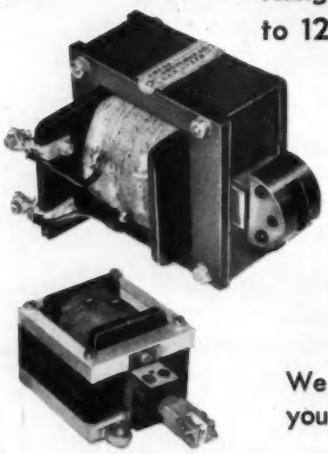

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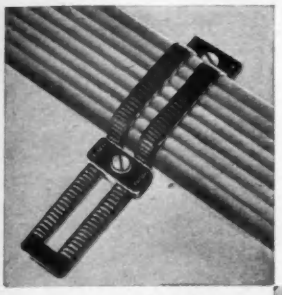

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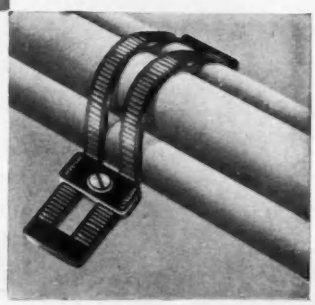

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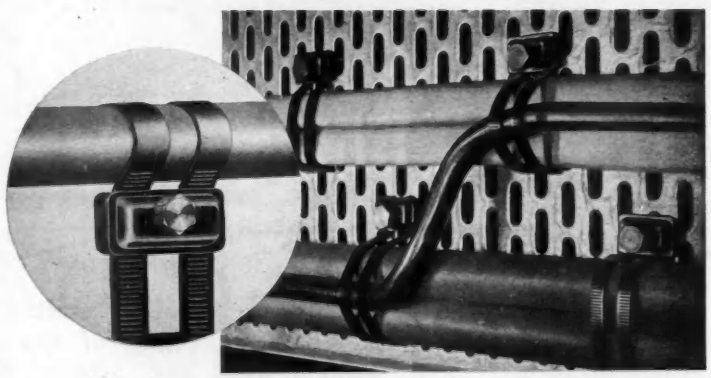
Type SAS Adjustable Saddles

These two point fixing single screw adjustable saddles are specially designed for use with standard cable racking, and cables of any diameter or diameters can be more efficiently secured in less time than ever before, bringing exceptional versatility to wiring schemes. The operational movements are truly remarkably simple as the three illustrations on the right below show, and the illustration on the left below examples the neatness and again the versatility of SAS saddles.



The self-locking tongue is placed as shown into rack slot and flicked at an angle of 90°.

The cable or cables are placed in position and saddled by the flexible nylon strap.

Then it's simply a matter of one screw fixing at any desired point along the length of the strap . . . and the cable is fixed.

Fully descriptive literature on both AS and SAS Saddles, together with sample components, if required, are available now.

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Bus Bar Insulation
NX, X & CY Cable Clips
Other **INSULOID** Products
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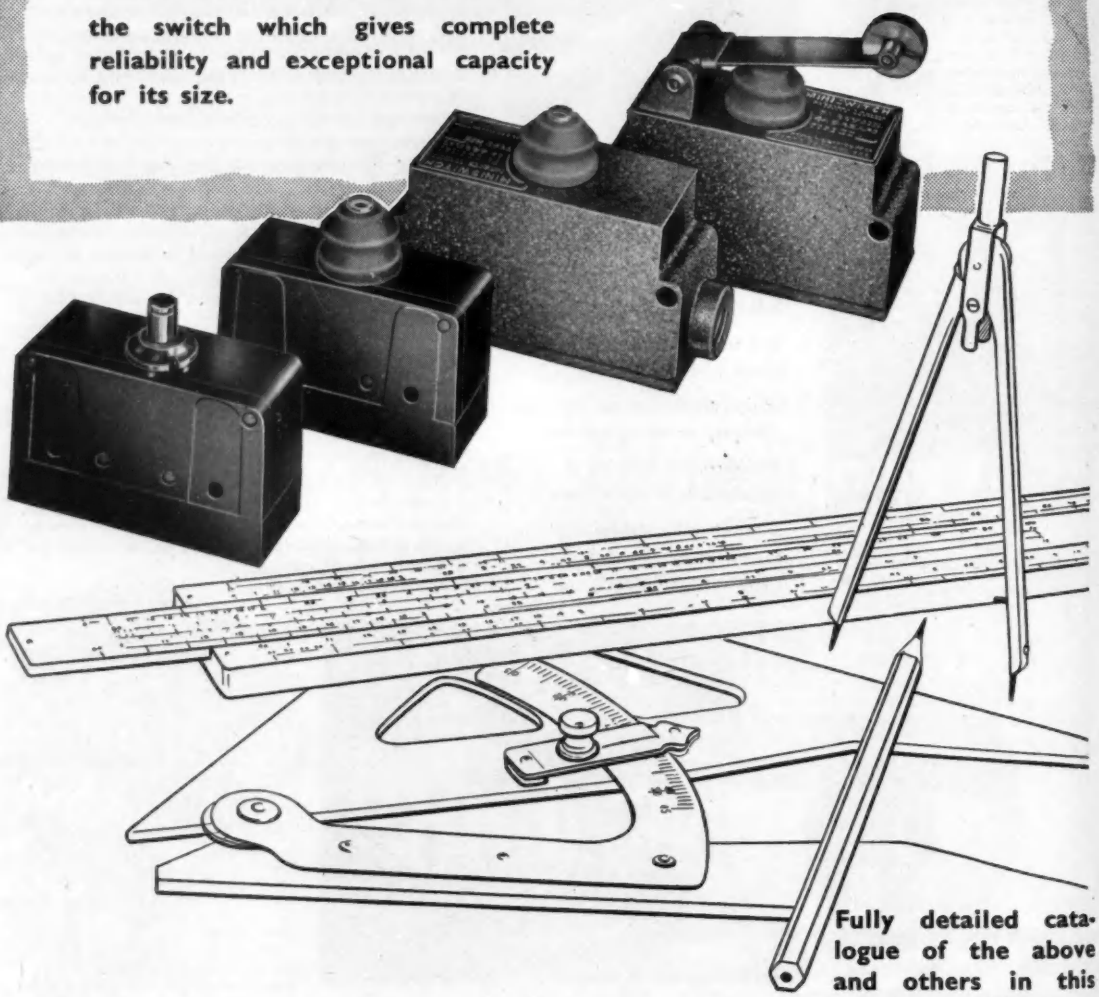

Fully detailed catalogue of the above and others in this range available upon request.

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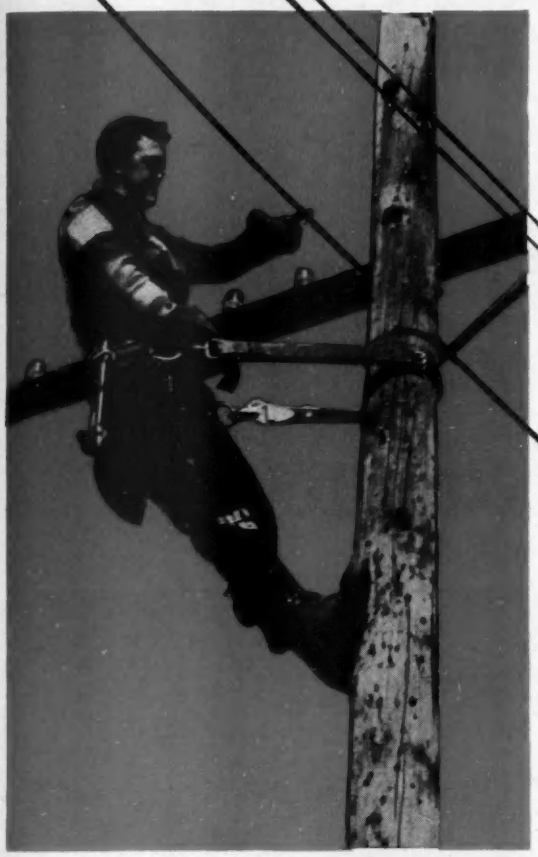

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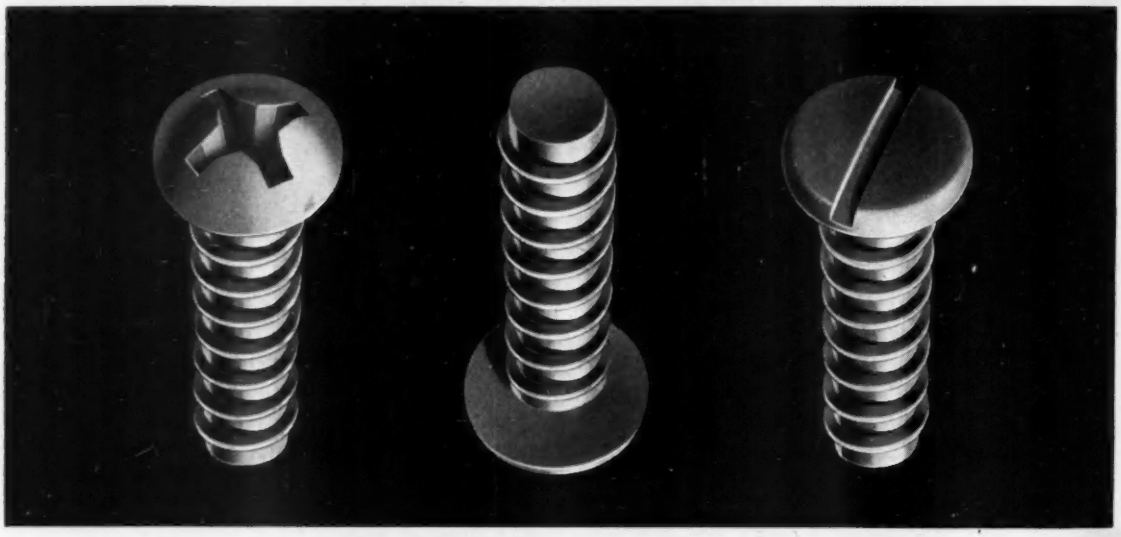
Important announcement to users of Simmonds Spire Speed Nuts



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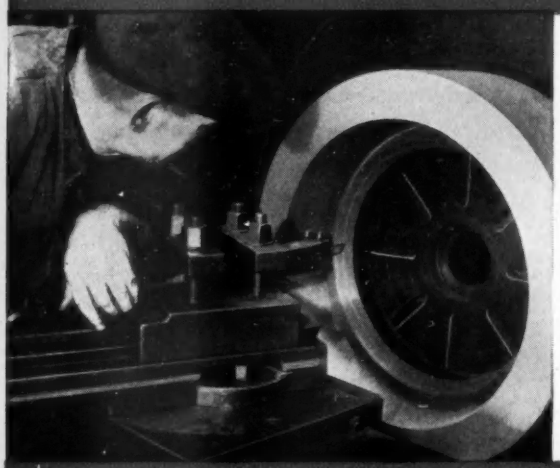

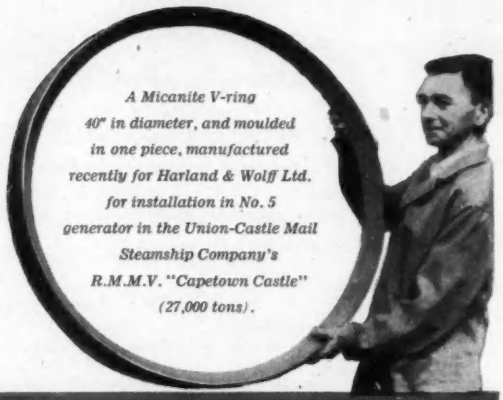

A Micanite V-ring 40" in diameter, and moulded in one piece, manufactured recently for Harland & Wolff Ltd. for installation in No. 5 generator in the Union-Castle Mail Steamship Company's R.M.M.V. "Capetown Castle" (27,000 tons).

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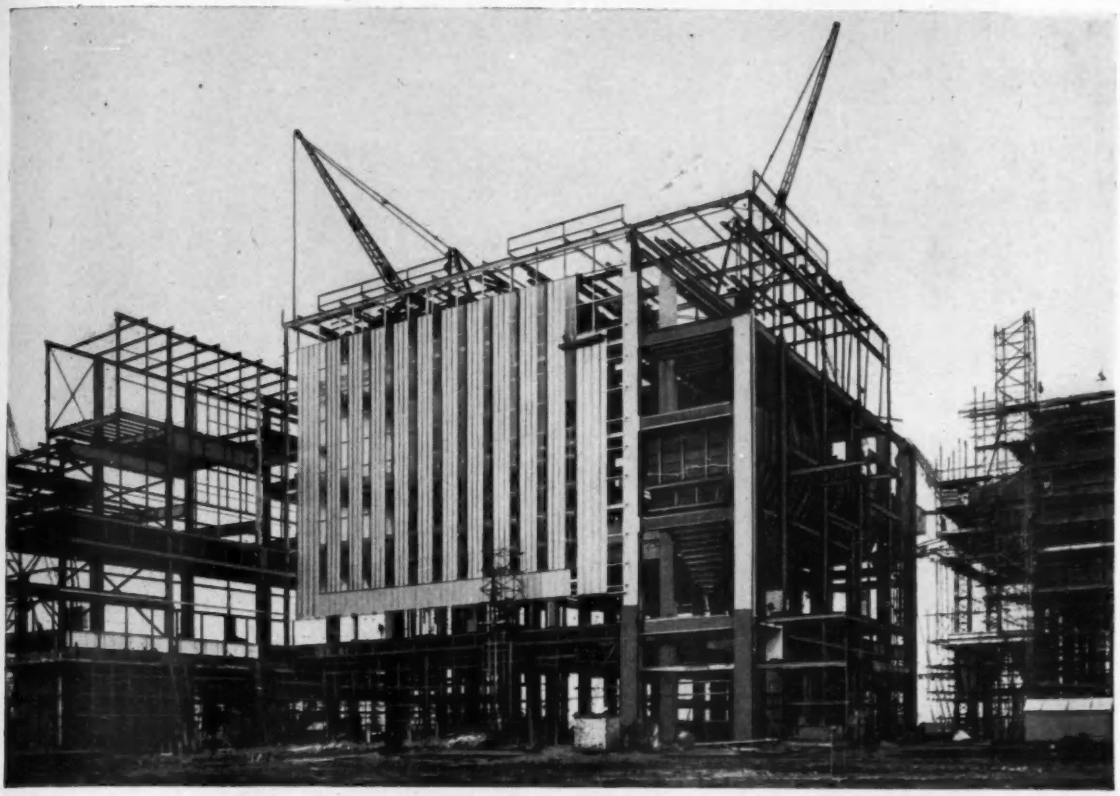

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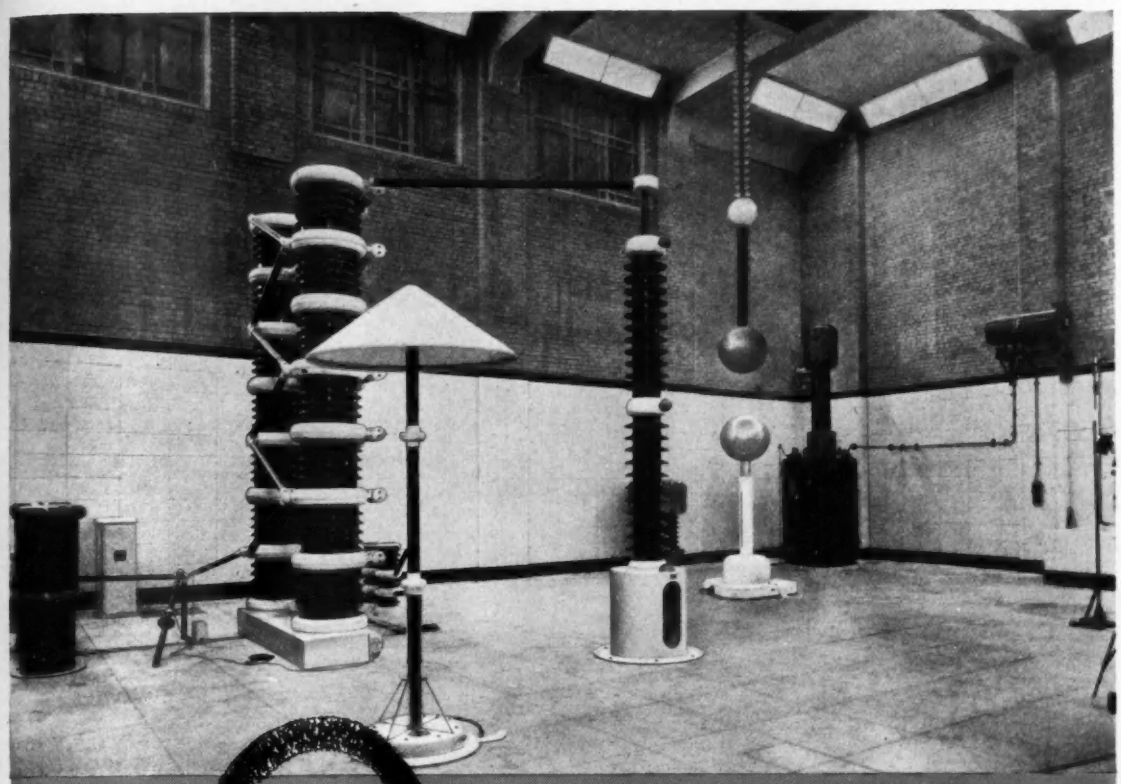

Ferranti High Voltage Testing Equipment installed at the Manchester College of Science and Technology

All the testing equipment illustrated has been supplied by Ferranti Ltd. and is installed at the Manchester College of Science and Technology. It consists of:

330,000 volt, 100 kVA single-phase 50 cycle Testing Transformer and Control Equipment.
750 mm Sphere Gap.
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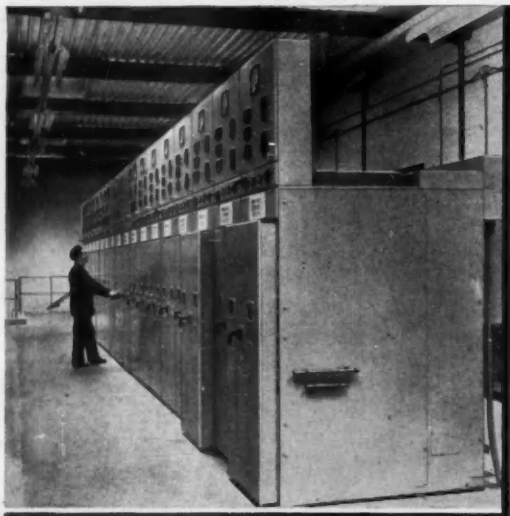
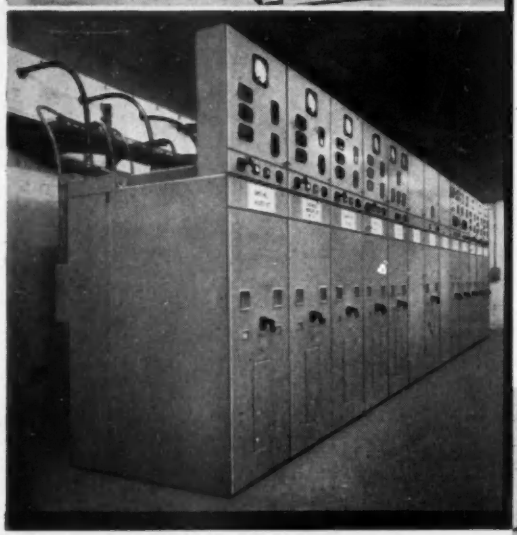




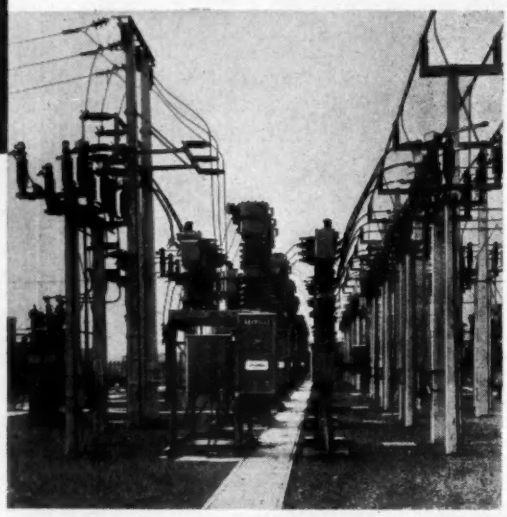
Photographs by courtesy of The Steel Company of Wales and the South Wales Electricity Board

THE STEEL COMPANY OF WALES

VELINDRE WORKS

The electrical distribution within the Velindre Works is controlled by Reyrolle 3·3-kV 150-MVA air-break circuit-breakers.

Reyrolle also supplied the 33-kV 1000-MVA outdoor small-oil-volume circuit-breakers controlling the incoming supply.



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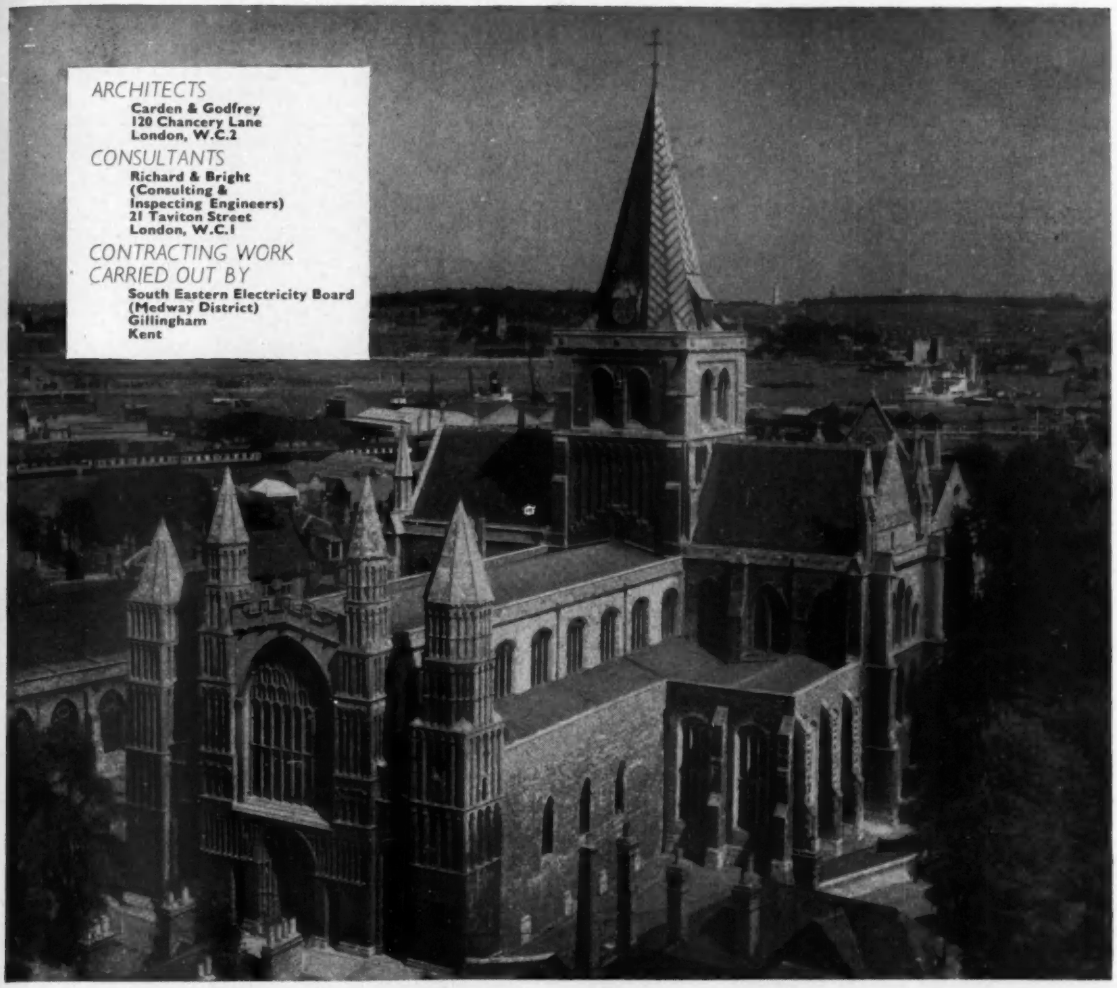

Rochester Cathedral

Considered to be one of the most interesting buildings in this country, it is a fine example of traditional English Church architecture. From one point in the Lady Chapel it is possible to see work of every century from the eleventh to the twentieth.

In the recent re-wiring of the Cathedral, mineral insulated cables were chosen because of their unobtrusive appearance. This installation is a perfect example of the usefulness of this type of cable.

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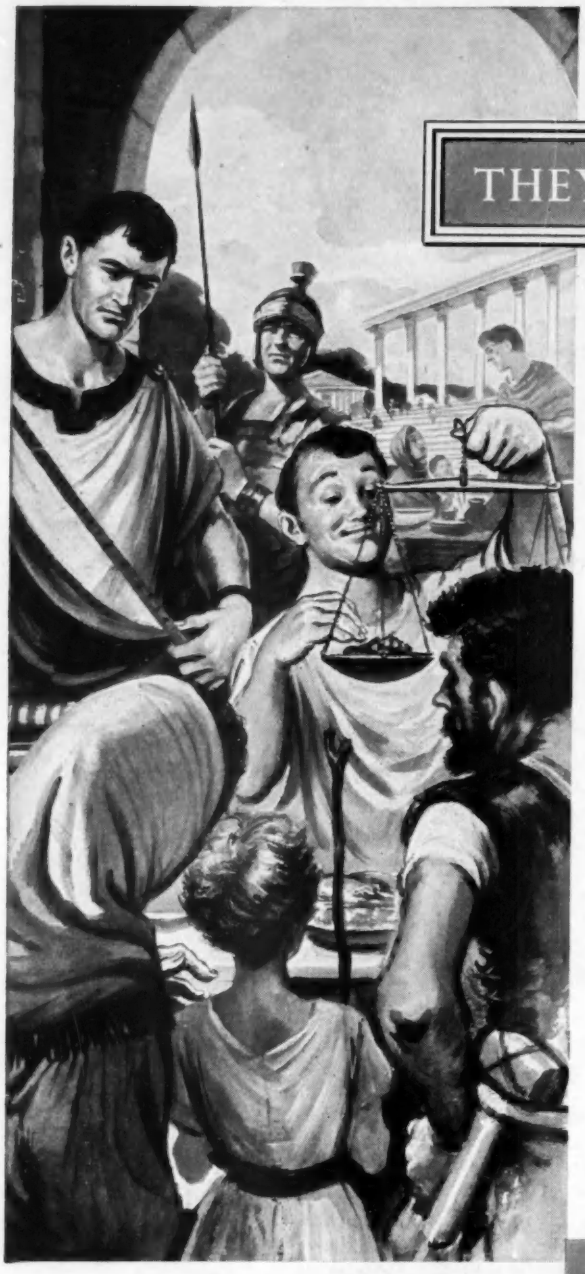

The market-place of a Roman town A.D.350.

THEY SET A STANDARD

IN the steps of the Roman legions that conquered Britain came the merchants and settlers. Secure under Roman law and administration, commerce and agriculture flourished, and Ancient Britain experienced a period of peace and prosperity it was not to know again until long after the Dark Ages.

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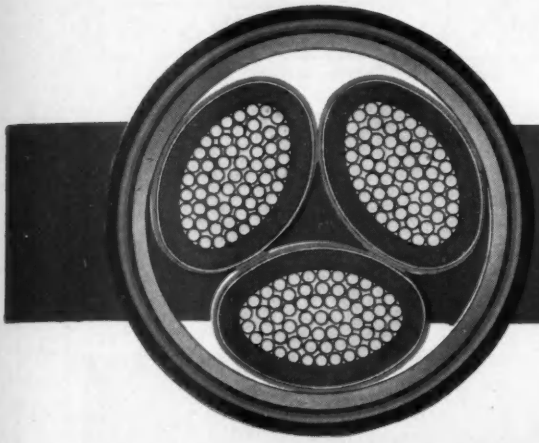

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in Oil-filled Cables

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Further information on D.S.O. Cables is contained in Publication No. 392—available on request.

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D.C. Test = A.C. Wkg volts x 3
To Earth, A.C. wkg volts + 1,000 volts A.C. or 2,000 volts A.C. min
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Power Factor: Better than 0.3% at working volts at 30°C

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			Length	Cross section of all units
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4 min	250	ZG102	2¼	
5 min	250	ZG103	2½	
6 min	250	ZG104	3	
7.4 min	250	ZG105	3½	
3.5±5%	400	ZG106	3¼	
6.8±5%	400	ZG107	5⅛	

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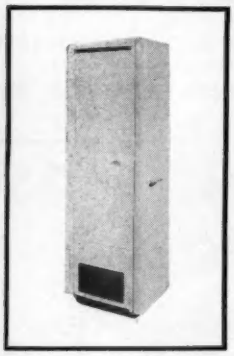

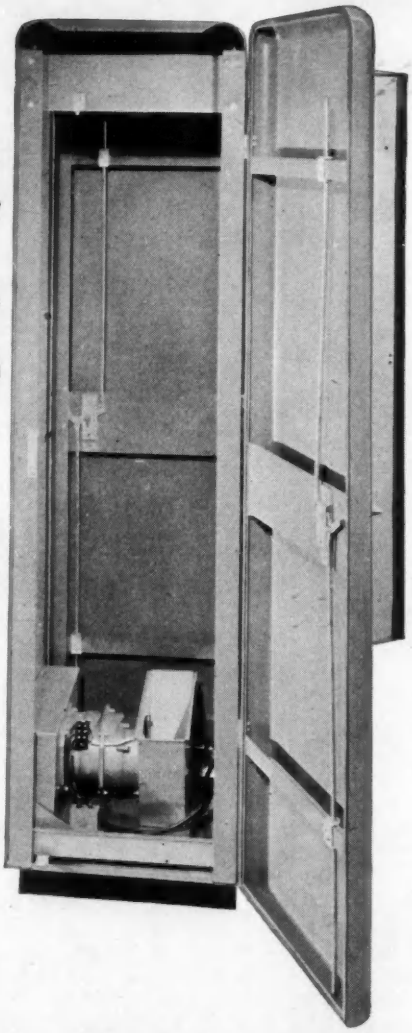

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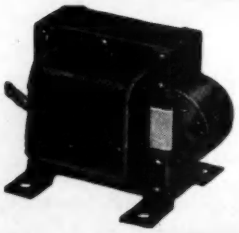

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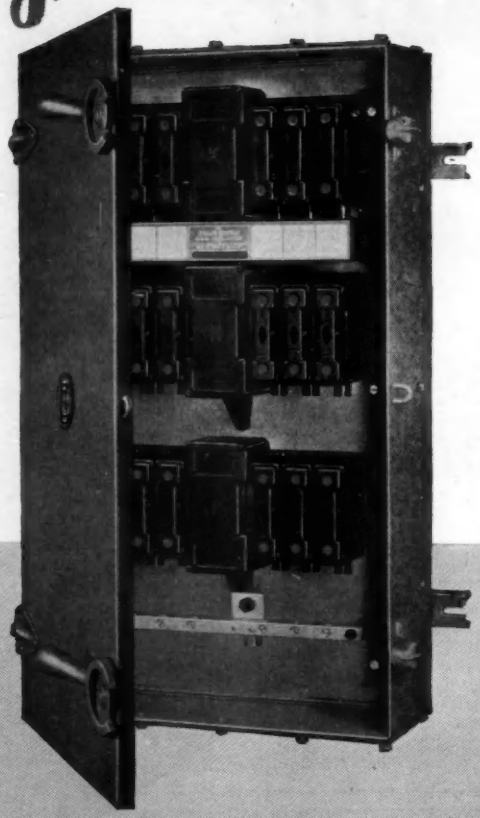

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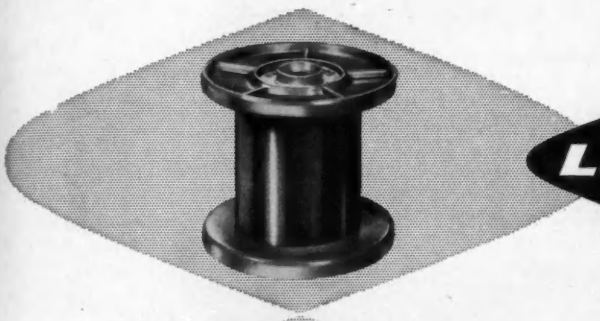

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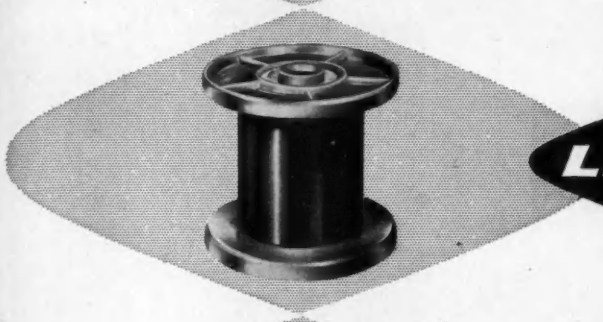

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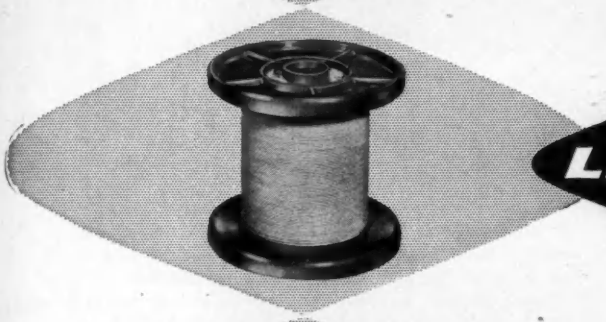

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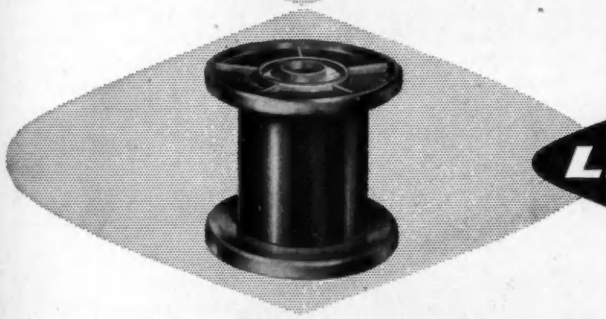

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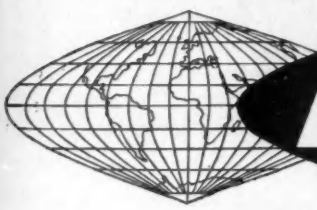

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1958

ELECTRICAL REVIEW

Managing Editor: HUGH S. POCOCK, M.I.E.E. *General Editor:* J. H. COSENS *Technical Editor:* P. W. TUCKER, M.I.E.E.

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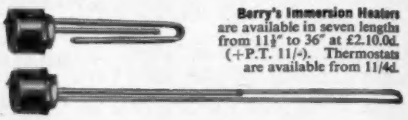

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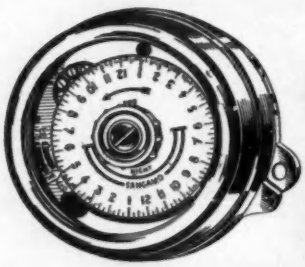

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ELECTRICAL REVIEW

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Contractors' Topics

IT is the custom of the Electrical Contractors' Association to get its President to review the industry's activities and problems in his address at the annual conference. We have found over a long period that the problems are perennial; they differ little except in intensity from year to year. Upon the whole the picture presented by Mr. H. S. Wathes at this week's Folkestone conference was perhaps not so sombre as some have been.

Relationships of the Association with the Electrical Trades Union (not specifically mentioned by name) seem to have been no worse than usual. There was no major strike, although we recall several local stoppages, but the question of apprenticeship proved a cause of dissension. We believe Mr. Wathes when he says that the aim of the E.C.A. is to provide the best possible training for young men entering the industry. Indeed it is only common sense that it should pursue this policy; how else can the industry survive? The E.T.U. apparently objects to differentiation between youths who will benefit from training and those who cannot or will not do so.

Some trouble has arisen through the payment of special rates by some other industries to their electricians who often work on the same sites as electrical contractors' men. The E.T.U. recently sought to secure the levelling-up of the latter's pay by the relaxation of the present national rules but its claim was rejected by the Industrial Disputes Tribunal. Mr. Wathes reiterated the point that there was nothing to prevent contractors rewarding extra skill and responsibility. This is a principle which trade unions generally do not regard very favourably.

Another subject which constantly agitates electrical contractors is fair trading—or, more simply, the proper allocation of trade discounts. The contractors claim that these should be restricted to the trade and Mr. Wathes called for a drastic revision of the Electrical Fair Trading Policy, which seems to mean that certain other classes recognised in the Policy as being entitled to special terms should no longer have that recognition. Mr. Wathes said that " having accepted this principle an immediate assessment should be made of what is a fair and equitable trade discount to ensure the lowest price to the public, preserving the principle that those who render a service in the field of distribution are entitled to a fair reward for their efforts." Should this be interpreted as lower or higher rates of discount?

For the rest, Mr. Wathes gave his members some sound advice on such things as

employer-employee relationships, accountancy and budgetary control and effective merchandising methods, all important matters in which many electrical contracting businesses are susceptible to improvement.

NETWORK ANALYSIS

WINA, the latest development in the computer world, manufactured by the General Electric Co., Ltd., which is described on page 965, represents a considerable contribution to industry generally and the electrical industry in particular. This is measured in two ways. First, although the equipment is at present being used in connection with the company's own design and development work, it will eventually be available to industry generally—presumably on a hiring basis. Secondly, the analyser in conjunction with the digital and transient computer available within the company, can deal with the full range of problems likely to be considered in the electrical industry.

It differs in basic principle from all earlier large commercial analysers in that it operates on the transformer analogue principle as distinct from the more usual miniature component type of model network assembly used on what is termed the " conventional " analyser. The transformer analogue type of analyser can cover a far wider range of problems than the conventional analyser since, for many intricate system and machine design problems, the conventional analysers are not readily capable of simulating the required type of physical component. Further, the transformer analogue analyser has the very high inherent accuracy of 0·1 per cent.

UGANDA GOES ELECTRIC

It is just over ten years since the Uganda Electricity Board was set up. In that short period the important project of harnessing the Nile at Owen Falls has been carried through and a network of transmission and distribution lines has been constructed to take the supply to remote parts of the country. When the Owen Falls scheme was first undertaken there were many who wondered whether a market could be found for the large output envisaged. In the event, it has become necessary to consider the construction of a second station, a start on which will have to be made by 1960.

The record in Uganda—which could have a counterpart in other undeveloped countries—is of ready acceptance of the benefits which electricity has to offer. Ten years ago, public supplies were confined to a wood-fired station at Gaba, near Kampala, and a diesel station at Jinja, with a total installed capacity of a mere 2,300 kW, and less than 7 million kWh was generated. Consumers numbered 3,000. At the end of last year 90,000 kW of the ultimate 150,000 kW of plant had been installed at Owen Falls, nearly 149 million kWh was generated during the year and revenue topped the £1 million mark. There are now 19,800 consumers and schemes are in hand for extending supplies to other areas. Since the close of the year a bulk supply has been inaugurated to Kenya via a 132 kV double-circuit line from Tororo to Nairobi.

ARCHITECT AND LIGHTING ENGINEER

The Illuminating Engineering Society has, for many years, encouraged active co-operation between the architect and the lighting engineer. This was exemplified at its biennial summer meeting held at Eastbourne last week both by the paper on " Lighting and Architecture " and by the number of architects who attended the conference and spoke in the discussions which are reported in this issue.

Two main points emerged from the conference on the roles of the architect and engineer. Everyone agreed that it would be impracticable to define a rigid dividing line between their respective tasks. So much depended on the function of the area to be lit and the overlapping capabilities of individual architects and engineers. The other point which emerged was the problem of communication and the translation of the architect's and engineer's jargon into simple language.

Many problems would not exist if co-operation between engineers and architects began in the initial stages of a contract so that the design purposes of both the building and lighting were fully appreciated by both parties. These initial discussions are essential when it is decided to incorporate the lighting in the building structure. However, as Mr. Grenfell Baines said, it is a matter of education and we feel that the conference helped considerably in this direction.

CO-OPERATION IN BUILDING

Probably most of us in the electrical industry have always thought of co-operation between the architect and builder and the electrical contractor mainly as an effort to obtain in the design stages of a building adequate provision for the installation of electrical equipment, particularly with regard to rising mains, switch and control gear and supply substations. When we asked Mr. E. E. Jacobi to write the article on this subject which is published in this issue, we thought mainly in these terms. Mr. Jacobi, however, makes it quite clear that a great measure of co-operation has been achieved, but he stresses that there is still need for closer working, mainly on account of new materials, particularly finishing materials for buildings, and the employment of new techniques in both the building and contracting industries.

As an example of new building materials in connection with which co-operation in the early stages of design is needed, Mr. Jacobi cites the pre-stressed concrete shell roofs which are becoming so widely used. This type of construction demands, he says, the most careful planning, not only of the positions at which outlets are to be provided, but of the runs to be taken by conduits and wiring materials, because fixing arrangements have to be such as to prevent interference with the stressing materials in the structure not only at the time of installation, but throughout the life of the building.

On the electrical side he refers in particular to the new schemes of floor ducts and emphasises the necessity of seeing that they are adequately covered in the finishing and that the flooring is sufficiently substantial to prevent sagging.

Modern Electrical Installation

The Necessity for Co-operation Between Architect and Builder and Electrical Contractor

By ERIC E. JACOBI, M.I.E.E.*

THE realisation that electrical and mechanical services were indeed necessary in buildings, and that in some instances a building was in fact only constructed as a shell for its services, came very slowly during the first years of this century. This was followed by the idea that provision could be made in the structure itself for the housing of services; but not until the period 1920-30 was it seen that the services and the structure could be made mutually suitable only if full co-operation existed at the planning stage between those responsible for the various aspects of the building.

Until the 1920's the services of a building were regarded with dismay by the architect because of the disfigurement they caused to his design when they were added after the building had been completed, and with horror by the tenant who saw in them expensive additions to a building for which he had made no financial allowance.

Older engineers can cast their minds back to the time when an occasional lighting point comprised the only "service," and the other services, taken for granted to-day, were merely the dim and improbable conceptions of some future period; even so it was not until the building had been handed over that thought was given to calling in the "electric light" contractor, the telephone authority, and others, who would then proceed to fix pipes and wires on the surface of the newly-finished and decorated walls.

Planning of Services

In the 1920's, however, many people began to understand that a new era had begun; the tenant realised that he himself could not work efficiently in his building unless he was aided by services then becoming rapidly available, and he foresaw that without such services his building (if built to let) could indeed only be let, if at all, at lower rents than he could obtain for a fully-equipped building.

At first co-operation existed in only a limited degree; but later it came to involve the architect, the tenant, the builder, the specialist consultants and craftsmen, as well as those who brought their services into the building from outside, such as the electricity authorities, the Post Office, and other public utilities. Vigorous propaganda from engineering specialists explained the necessity of planning the services as an integral part of the structure, using such methods in the design of the structure as would enable the services to be installed and effectively housed during construction. Thus the disfigurement and expense of adding cables and pipes on the surface of the building after it had been completed and decorated, could be avoided.

The tenant himself took into account the costs of providing services as a part of his total financial commitment, and he was not, therefore, embarrassed by unforeseen additional expenses. At the same time he found that he would be able to take care of the inevitable changes in the future use of the building without difficulty or inconvenience.

The builder saw that although by co-operation his work would not necessarily be simplified—in fact it might become more complicated—it would in the end enable him to work to a programme and to complete a clean and efficient building, with the service facilities contained in its structure, in good time. The sub-contractors similarly realised that their own work would be more thoroughly dealt with and that they would not continue to meet a sales resistance against the provision of their particular products; and that where one outlet point had been reluctantly admitted, a number of points would now be considered essential. They could work to the programme laid down by the general contractor and start and finish accordingly.

Thus in the era between the two wars, as a result of such clearer thinking, the necessity for planning the services in the design of the building gradually became recognised and early co-operation between all responsible parties concerned became more frequent, even to the extent of holding such consultations at the drawing board stage.

Many articles were written and appeared in the technical and lay Press, and British Standards and Codes of Practice were prepared to give guidance and general advice to those about to plan. Authorities such as the Post Office published books and pamphlets giving closely-reasoned arguments for the necessity of thinking in advance and for providing suitable arrangements in the structure for the installation of their wires and equipment.

The Electricity Boards came forward into consultation to indicate the nature of their requirements in respect of a supply; where transformer equipment was considered necessary, suitable provision could be made for trans-

The switch-room of a building only twenty-five years old showing the result of lack of co-operation at an early stage

* Technical Director, Troughton & Young, Ltd.

former chambers, and where ducts were required to bring in cables from the street, they could be provided in the footings of the building. Switchrooms were allowed for as a necessary part of the installation and were planned to suit the service point on the one hand and the general requirements of the installation on the other. Ducts, rising and lateral, for the installation of cables and pipes vertically and horizontally within the building, came to be acknowledged as essential and were incorporated in the design of the structure.

The nature of the floor and wall finishes were discussed in detail in relation to the conduits and wires they would hold; the planning of holes through floors and of chases in walls, to eliminate the cutting away of finished work, began to be dealt with in the initial stages of the building and in distinction to past experience, comparatively little trouble was experienced during the actual course of construction.

Effect of Improved Techniques

But time does not stand still and after the war many changes were to take place which have resulted in a new and distinctive planning era. The changes that have come about cover differences and improvements in building materials, techniques, and structural design, and advances in the design and arrangement of the electrical and mechanical services themselves. As a result of such changes, a new stage has had to be introduced into design: that of working out the effect of new materials and methods from first principles.

Not for many years has design had to be considered in this way in the building industry, but it is typical of the effect of the rapid advances made in this scientific age on all classes of industry: means must be found for adequate examination and analysis of the ideas put forward before they can be introduced into normal industrial practice. It is, therefore, not now sufficient to co-ordinate services when the building is at drawing board stage; before even the first elements of design can be considered, the new methods have to be proved suitable for practical use.

Before structural methods and service requirements can interlock, their relationships require mutual discussion of a general nature between the consultants for the structure and the consultants for the engineering services, and it is only when the practicable limits have been decided that the architect can proceed to incorporate such proposals into his plans, and the design of the building can be put in hand with the assurance that the new methods can be made to work.

Cut-away section of floor with embedded heating system showing the various layers of floor finish

Among the new structural methods becoming normal to-day are those involving pre-stressed concrete, the elimination of load-bearing walls, and especially load-bearing external walls, the development of partition structures to make for a flexible and convenient arrangement, reductions in the depth of screed and other floor finishing material, the use of finishes other than plaster, the provision of acoustic and similar panels, and the use of special floor finishes in place of wood blocks or floor coverings, and, in addition, the increasing tendency to use plastic materials in place of wood or metal. Even the relaxation of certain building height regulations has had its effect on the techniques required.

On the mechanical side, the heating services, water or electric, may be embedded in the structure, ceiling, floor or walls, or they may be provided in the form of units very different from the conventional arrangement of radiators under the windows. Different forms of ventilation and many new types of mechanical services have been developed to meet modern trends. Electrically, the variety and extent of services are growing enormously; new wiring materials, new fittings and equipment, and new methods of installation, develop constantly; completely new types of electrical services are always ready just round the corner and come to be taken for granted long before the building has completed its useful life.

There is, too, a more subtle change to be considered, in that there is not only a constant advance in building construction and service methods, but the rate of such advance is increasing continuously, and the tenant's desire for more effective use of his costly space results not only in his insistence on the provision of the most modern service equipment possible, but for the possibility of adding new services, the result of further research, at any time in the future.

Thus, in summary, the three periods in the history of co-ordination of services and planning in buildings may be briefly described as follows:—(*a*) First quarter of this century:—Buildings erected without regard to services; (*b*) Second quarter of this century:—Buildings erected with services provided on a medium scale sufficient only to attract the tenant, but small enough in scale to keep down capital cost, the whole, however, given consideration during the design of the building and in the early stages of its construction; (c) From now onwards:—An increasing rate of change of structural design, the use of new building methods and materials, new services and new service methods; a widening range of tenants' requirements, present and future; consideration of the basic elements of construction, design and services, to be dealt with before the initial planning of the building.

None of the new designs and methods need present insuperable difficulties if the problems are first tackled by discussion between the designers responsible, although it must be added that even now attention is not always given to elementary factors; for example, it is still common to find a new material applied in insufficient depth to house such pipes or conduits as it may be called upon to contain. Thus, when full consideration is not given and the design of the building and of its separate services are developed independently, considerable difficulties can arise and cannot always be easily overcome.

There are, of course, occasions when new installation

materials are not only suitable for use with new structural materials and methods, but provide the only possible method. In this respect a good example may be given in one solution of the problem indicated above: the use of mineral-insulated copper-covered cables of comparatively small diameter allows wiring to be run on the structural surface and yet to be embedded in a wall or floor finish which would otherwise have been too thin to cover a normal conduit installation.

This particular example, moreover, gives an indication of the necessity for an even further advance in the co-operation between the main contractor and the specialist sub-contractors; this concerns the practical details of ensuring, first, that exposed cables are undamaged while structural work is in progress, a precaution that has not always been taken in the past but is of prime importance now that materials may not be as damage-resisting, as, for example, steel conduit; and, secondly, that the chemical composition of material in contact with the cables does not cause detrimental reaction.

Examples of Co-operation

In the following survey, a number of examples of methods involving co-operation are considered; some of the factors have already become standard, but others are slowly evolving in the light of the practical experience obtained over the past few years.

It is now normal practice to use under-floor ducting in large buildings to convey various electrical services and to allow for alterations to services during the life of the building. For this purpose structural floors must be smooth and level. The ducts require a suitable depth of screed, which, if too thin, gives inadequate space for the duct and defeats the purpose for which it is installed; the thickness of cover over the duct must be such as to prevent sagging of the floor surface. At cross-over positions boxes have to be provided in the floor structure and cover trays are necessary; such trays are normally designed to house flooring material which should, therefore, be of a type which will allow this to be done.

The use of floor construction which is in itself a duct system is only now beginning to make headway in this country, although it was developed abroad many years ago. Such floor construction and the associated electrical problems will now begin to demand very close co-operation between the design specialists concerned to ensure that it fulfils its mechanical and electrical purposes effectively.

The next example refers to the use of floor and ceiling panels or elements for heating; these systems incorporate solid panels or may consist of pipes in which water or other fluids may be used, or they may consist of electrical elements laid directly in the construction or drawn into embedded pipes. Several quite different aspects have to be considered in this case; first, the relationship between the dimensions of the equipment involved and the thickness of the material in which it is to be embedded; secondly, the possibility of effects due to the temperature of the elements, the nature of the materials used, and the type of structural material, with special reference to chemical and physical properties, as, for example, its behaviour under expansion. Thirdly, the precautions necessary to ensure that pipes or elements are not damaged in the course of installation or during building processes, especially where the pipes are water-filled or where an electrical scheme is employed in which the elements cannot be freely withdrawn and replaced. Fourthly, either the pipes or the elements of the system must be designed to be placed away from the centre lines of electrical outlets, or, alternatively, the electrical outlets must be designed to be placed at positions which avoid the pipes. It can be quite normal for the pipes to be run at centres of a few inches and this allows little latitude in the fixing of outlets and other services, while even a small divergence may cause an outlet to appear out of centre with the design elements of the room.

The "space frame" of a laboratory building at Cambridge (architects, Easton and Robertson), being an example of a building primarily designed to give accommodation for the services required

A programme of work for the installation of the elements would in this case include: casting of the structural floor, adding a limited screed finish, and installing the element conduits or the elements themselves, adding a final screed and final floor finish.

In another method of electric heating, night storage block heaters may be used and in this case there are several separate design considerations to consider: for example, the installation of the block heaters so that they do not obtrude into valuable space in the building, their correct placing for their heating function, and ensuring that the weight of the heaters is taken into consideration in the design of the floor.

Office Partitions

In office buildings one of the normal problems occurs in connection with the partitions, which often may not be decided upon until the building and the installations have been completed, and may then be of special types, presenting difficulties in providing wiring to switches and other outlets. Among materials used for partitions other than the usual brick or breeze materials, are foam slag, cement, wood shavings, holoplast, sheet steel, etc.

Most designers of steel and similar partitions allow points for the entry of the wiring and for the fixing of the outlet accessories, but where other materials are used, not only may there be no space in which to conceal the wiring, but there may be considerable difficulty in fixing the accessories firmly. Even where some allowance for the electrical work has been made in the design of the partition, simple precautions are often omitted. For

example, entries may be formed which cannot be bushed or protected, or a partition may be so designed that once it is erected the wiring is inaccessible either for drawing in or drawing out.

Difficult constructions to deal with from the point of view of services are pre-stressed concrete shell roofs and pre-stressed concrete beams. This type of construction demands the most careful planning, not only of the positions at which outlets are to be provided, but of the runs to be taken by the conduits or other wiring material to the outlets; fixing arrangements have to be such as to prevent interference with the stressing materials in the structure not only at the time of installation but throughout the life of the building.

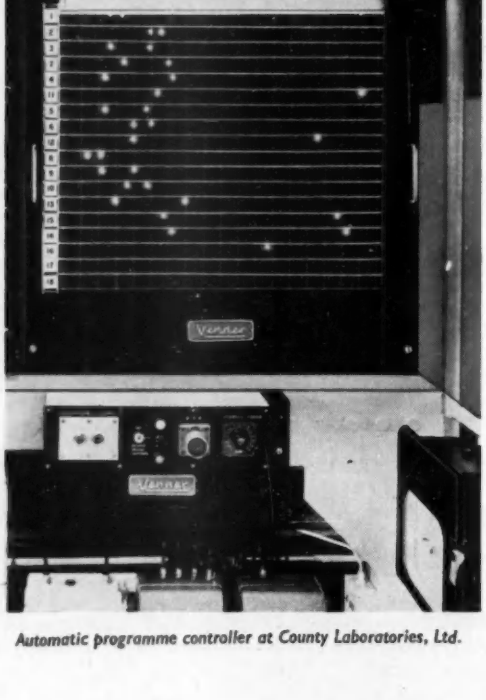
Finally, as a further example of modern trends, consideration must be given to the problems arising in the very tall buildings now being erected. The problems that arise are not so much structural as operational, and although they arise only during the actual construction of the building they are problems that should be discussed and settled before the work is started.

Such problems concern the storage of suitable materials at various levels in the building (the time being past when an electrician's mate would walk up many flights of stairs carrying a bundle of conduit), the necessity to get the men up to and down from their correct working level without an immense waste of time, and also the possibility that the order of building finishings instead of commencing, say, at the top of the building and working downwards, may very well commence at several levels in the building and work upwards and downwards from those levels. Very serious consideration must be given to the co-ordination of the various services in these circumstances.

While most of the remarks already made refer to many types of buildings, nearly all that has been said applies particularly to the office blocks which form a substantial part of modern building. It is in this type of work that the employment of modern materials, building methods and new services is most advanced. Here the lesson of initial co-operation has been taken very seriously by all concerned, and indeed it is the only basis on which these buildings could be completed in the very short periods allowed. In smaller types of buildings, however, even the lessons of the inter-war period have not been thoroughly digested and it is still possible to find little or no consideration given to the services, or any appreciation of the savings that can be made if the building and the services can be intimately related to the type of structure and methods of construction used.

Process Automatic Control

A BATCH manufacturing cycle previously controlled by a skilled operator has been successfully converted to fully automatic operation by County Laboratories, Ltd. A predetermined manufacturing cycle was broken down on a time basis and an automatic programme controller designed and built by Venner, Ltd., now controls the processes throughout the complete manufacturing batch cycle. The process involves the introduction of various liquid and semi-liquid ingredients into a large batch mixing vessel which also requires strict control of its jacket temperature at varying levels.



Automatic programme controller at County Laboratories, Ltd.

Following a careful analysis of the many operations required at each point in the time cycle, a twenty-two bank cam controller has been designed. This is driven by a synchronous motor geared to give one revolution per batch cycle. Low voltage contacts are opened and closed on each cam position, dependent upon the pre-arranged programme setting. The signal from each set of cam contacts is fed to a low voltage relay whose contacts operate the mains feed to motor starters, pumps, mechanised valves, etc., and these units, in turn, control the transfer of ingredients to the mixing vessel, and the steam and other services associated with the manufacturing plant.

To enable the plant supervisor to have a visual picture of the process at all times during the manufacturing cycle, a series of low voltage red and green lamps are mounted in the front of the control panel but behind a ground glass screen. These lamps are spaced across the screen in accordance with the time scale of the process, while at the top of the screen is an illuminated time scale traversed by the shadow of a cursor driven by a synchronous clock movement. The lamps, which change from red to green when an operation is in progress, are controlled by contacts on the motor starters or electrically operated valves controlled by the cam controller. This ensures that the lamps will change colour only when the switching called for by the programme controller has actually taken place.

Provision is also made whereby any particular operation of the manufacturing cycle can be omitted or controlled manually if desired, while still retaining automatic control of the remainder of the batch cycle operation. The same features enable rapid fault finding or routine service checks on the operation of particular valves, pumps or motors to be carried out without the need to operate the plant through the entire batch cycle time. Facilities are incorporated which automatically shut down the plant if fault conditions develop, in which case all valves are returned to the closed or safe position, pumps stopped and mixers brought to rest. Interlocks also prevent the programme controller starting its cycle if initial temperatures of vessels or ingredients are incorrect.

Pull-Through Windings

Modifications of E.H.V. Motors

By J. BAILEY, A.M.I.E.E.

IN the works of the organisation with which the author is concerned, there are a considerable number of 6·6 kV motors, the basic sizes being 250 b.h.p. and 500 b.h.p. A number of these machines are of Continental origin, and, while mechanically they are of supreme quality and workmanship, certain electrical troubles have been experienced.

The original electrical specification of a typical 250 b.h.p. stator is as follows:—

B.h.p.: 250;
Synchronous speed: 600 r.p.m.;
Type of winding: concentric chain, " pull-through ";
Number of stator slots: 90;
Type of slot: semi-closed;
Coil sides per slot: 1;
Turns per slot: 36;
Conductor: 0·104in diameter round copper;
Slot insulation: moulded mica, closed envelope wall thickness, 2·5 mm.

A cross-sectional view of a typical slot is shown in Fig. 1. The original conductor insulation consisted of braided single-cotton covering, and the slots were packed with a form of cement which is believed to have been zinc oxide, but its precise nature and method of introduction into the slots is not known.

When these machines came under the author's supervision he found that stator breakdown, due to defective inter-turn insulation, was frequent. This was generally attributed to the fact that the air in which the machines were working contained fairly heavy concentrations of carbon black. Investigation revealed, however, that the faults could not be related to the presence of carbon black. The defects invariably originated inside the slots. The conductors, as can be seen from Fig. 1, are enclosed in a mica envelope, and the end turns and the slot ends are heavily taped, preventing access of dust, etc. to the windings. At no time was any trace of carbon black ever discovered inside the slots.

Breakdown from Movement and Moisture

The trouble was caused by deterioration of the cotton insulation on the conductor, which was frequently found to have been reduced to a powdered coating, easily removable by passing the conductor between finger and thumb. The presence of moisture was almost invariably evident, as was indicated by the verdigris on the copper. It was inferred that the turns inside the slots were not properly consolidated, resulting in relative movement between turns due to mechanical vibration. This factor, plus ingress of moisture, resulted in ultimate disintegration of the cotton covering with the consequences already described.

It became obvious that a complete rewinding programme would be required to reduce the number of faults on these machines to manageable proportions, and attention was directed to the evolution of a new winding specification designed to eliminate the defects hitherto experienced.

The first solution to be considered was the hairpin type of coil. With such a construction the slot insulation can be moulded on to the coil, and the complete assembly fitted into the slots. This form of construction is widely used and produces a first-class result, but there were certain practical difficulties to be overcome. In the coils under consideration, 35 joints would be needed for each coil after the " hairpin " had been pushed into place. These joints are normally made by butt-welding, and whilst this is simple under production conditions, it presents difficulties in a repair shop. There was also the question of moulding the slot insulation, and the design and construction of suitable formers for fabricating the coils. The alternative was to retain the original " pull-through " design and attempt to eliminate the defects. This proposal had the advantage that all the formers for shaping the winding existed, and we also had skilled labour, accustomed to their use.

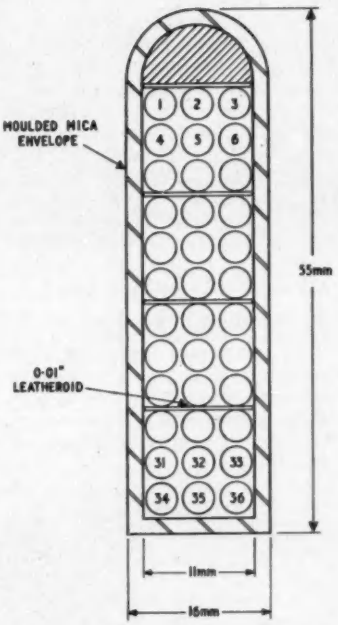


Fig. 1.—Typical slot of 250 h.p. stator

The chief defect in the old winding was considered to be the lack of consolidation of turns in the slots, and the complete absence of impregnating varnish. It was, therefore, decided that if a modern type of conductor insulation were used, and the turns inside the slots were heavily impregnated with varnish with good bonding properties in addition to a high standard of insulation, then this would solve the problem.

A major improvement in conductor insulation was attained by the use of " Lewmex " insulated winding wire, the insulating film being of Grade " T " thickness. This was cushioned by cotton braiding overall. It was considered that such a specification would be much more resistant to the destructive effects of vibration than the original single-cotton and braid covering, and would, of course, be less liable to damage from abrasion during the winding process. The greatest difficulty proved to be that of impregnation, and after various known methods had been considered and discarded, a novel method was evolved, which, to the best of the writer's knowledge, is new.

The system comprises the injection of varnish into the slots under pressure. In this process, the coil is wound

into the stator slots in the normal manner, i.e. by packing steel pins into the slots in the same formation as the desired winding and withdrawing the pins in the correct sequence, the conductor being pushed in behind the pin as the latter is withdrawn. The final turn of the winding is left out, however, at this stage. The pin for the final turn comprises a steel tube of about the same outside diameter as the overall diameter of the insulated conductor. This tube has a series of holes drilled in the wall. There are six such holes at 1in centres drilled on a spiral, and the drilled section of tube is arranged so as to be situated approximately midway between the two ends of the slot. One end of the tube is blanked off, and the other end is fitted with a flexible tube for connection to the varnish container. A diagram of the system is shown in Fig. 3.

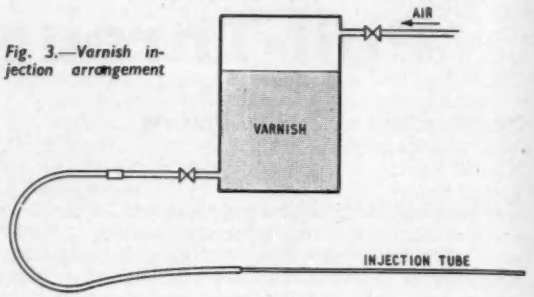


Fig. 3.—Varnish injection arrangement

The method was tested on a dummy mica envelope of the same type as that fitted in the slots, packed with conductors and insulated in precisely the same manner as the actual stator winding. An air pressure of 120 p.s.i. was applied, and in about two minutes varnish appeared at the ends of the envelope. The process was then discontinued and the envelope was heat treated by baking for four hours at about 100 deg C to drive off the solvent, and finally cured at a temperature of 140 deg C for sixteen hours. The envelope was then removed and the conductors were examined. Impregnation was absolutely complete and uniform. The insulation on every conductor was deeply impregnated, and the bonding between turns was such as to completely preclude the possibility of relative movement. The winding was also completely cured, no traces of solvent being found. The varnish used was Sterling No. S.515, and the tests were conducted and the curing process established in conjunction with the Sterling Varnish Co., Ltd.

Re-winding Procedure

In conclusion, it may be of interest to describe the method of application to an actual stator. The winding comprises 15 groups, made up of seven inner groups, seven outer groups, and a transition group. A photograph of the winding is given in Fig. 2. This shows all the inner groups in place, and also the transition group (at " eleven o'clock " in the photograph). The final turns have all been left out, and are coiled up at the remote side of the stator in the photograph. Two slots are injected at the same time, and the injector tubes and the varnish reservoir can be clearly seen in the foreground. The end turns are impregnated by manual application as winding proceeds. At the stage shown, they are bound in position but not taped. When all the inner groups and the transition group are in position, the winding is impregnated, the final turns are pushed in, and then cured for four hours at 100 deg C and 16 hours at 140 deg C. The coil ends and the protruding envelopes are then taped. Taping is deferred until this stage so as to facilitate the driving off of the solvent. The seven outer groups are next wound in place, and treated in exactly the same way as described above. Finally, an external application of varnish is applied to the taping and cured by a short final bake at 140 deg C.

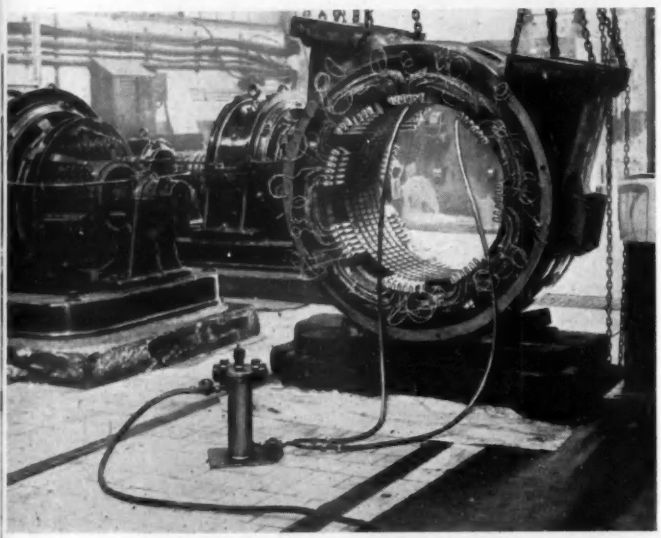


Fig. 2.—Application of the method described, showing the inner groups of windings in place

The work is carried out in two stages because of the impossibility of taping the inner groups with the outer groups in place. If, however, the inner groups were to be taped progressively as wound, it would not be possible to insert the injection tubes in the slots. Moreover, the evaporation of the solvent would be impeded, and there would be a risk of incomplete curing of the varnish inside the slots.

To date, nine machines (six 250 b.h.p. and three 500 b.h.p.) have been re-wound as described above. The cost compares very favourably indeed with quotations originally obtained for re-winding with " hairpin " type coils, and no trouble of any kind has been experienced so far from these machines.

Acknowledgment is due to the Michelin Tyre Co., Ltd., for permission to publish this article and the photograph in Fig. 2.

Protective Transformers

UNDER the above heading the British Thomson-Houston Co., Ltd., has produced a 48 pp. booklet by Mr. J. G. Willings, M.I.E.E. After discussing the difference between a protective and a measuring transformer, the author describes in detail the two main types of protective voltage transformers, viz., electromagnetic and capacitor. The basic principles of operation and application of protective current transformers are then given. The author re-examines many of the fundamental principles of protective transformers and presents some new conceptions of the subject. A section is devoted to works and site testing.

The booklet is well illustrated by diagrams and photographs and will, we feel sure, be welcomed by all engineers interested in protective transformers. The company will be pleased to send a copy of the publication (G.11026) to any professional engineer who cares to write for one.

Turbo-Alternators for Canada

200 MW CROSS-COMPOUND SETS

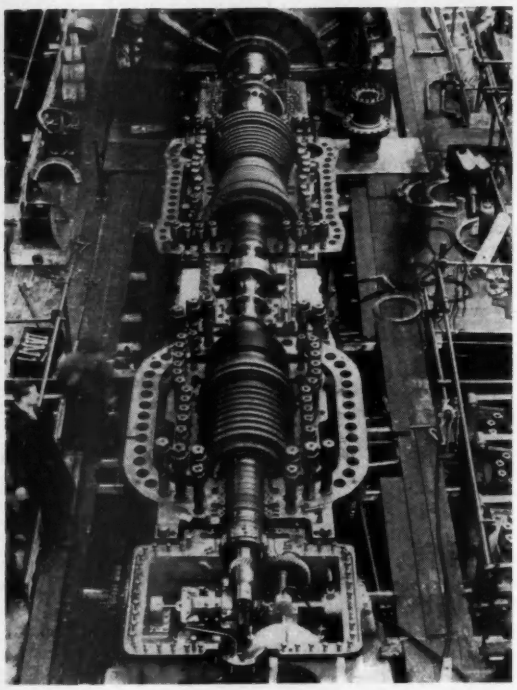
FOLLOWING the commissioning of the first Parsons turbo-alternators in the Richard L. Hearn generating station, Toronto, during the years 1951-53, the Hydro-Electric Power Commission of Ontario have now ordered from C. A. Parsons & Co., Ltd., four 200 MW turbo-alternators to be installed in the same station, which will give it an installed plant capacity of 1,200 MW, making it, it is believed, the largest station in the world with all the sets made by one manufacturer.

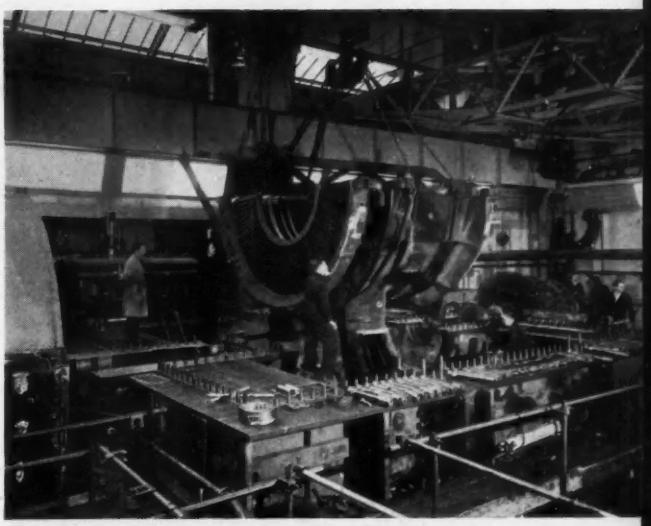
These 200 MW sets are of the cross-compound design, one line consisting of a h.p. turbine and a double-flow intermediate turbine driving a 100 MW alternator at 3,600 r.p.m., while the other line consists of a second intermediate turbine and a double-flow low-pressure turbine driving a 100 MW alternator at 1,800 r.p.m.

The units are designed to operate with steam at a pressure of 1,800 lb/sq in and a temperature of 1,000 deg F, with reheating of the steam between the h.p. cylinder and the first i.p. cylinder to a temperature of 1,000 deg F.

Steam from the steam chests is admitted to the h.p. turbine at the end nearest the alternator and passes from the exhaust of this cylinder to the reheater. It is then led to the centre of the first i.p. turbine and flows outward to the ends, from which it is passed to the second i.p. turbine which is on the 1,800 r.p.m. line. From this cylinder the steam is exhausted through twin overhead pipes into a double flow l.p. turbine, and thence through the two exhausts into the condenser.

The h.p.–i.p. line with the turbine cylinder covers removed





Inner cast-steel blade carrier of low pressure cylinder being lowered into place

The h.p. cylinder is of the double shell design, arranged so that the outer surface of the inner cylinder is continuously washed with a flow of steam adequate to maintain a reasonably uniform temperature across the cylinder wall. The material for the inner and outer cylinders is chrome-molybdenum-vanadium steel. Inside the inner cylinder are located separate nozzle blocks which take the full steam pressure and temperature, an arrangement which assures minimum distortion due to temperature variation and helps to eliminate thermal gradients during starting, stopping and loading. The first i.p. cylinder is also of double shell design, the outer casing being of carbon-molybdenum steel and the inner of chrome-molybdenum-vanadium steel. The second i.p. cylinder is of single shell construction, the material being carbon steel.

The l.p. cylinder is of a very rigid construction which consists of an outer fabricated shell and an inner cast-steel blade carrier. The outer shell, in which are located the l.p. spindle bearings and which consequently carries the considerable weight of this spindle, consists of three massive sections.

The h.p. turbine shaft and that of the first intermediate turbine are of solid construction, the material being chrome-molybdenum-vanadium steel. A hollow forged drum, integral with the shaft at one end and closed at the outer end by a flanged forging which is extended to form the other end of the shaft, is the construction used for the second intermediate turbine shaft. The l.p. turbine shaft is built up of discs of nickel-chrome steel shrunk on to a carbon steel shaft.

The blading in the h.p. turbine comprises a two-row

impulse wheel followed by ten stages of reaction blading. This type of reaction blading is also used throughout the first intermediate turbine. An improved form of blade sealing is incorporated in the h.p. turbine. The last row blades at each end of the l.p. cylinder are cast into cast iron frames located in the centre section of the cylinder with the rest of the blading. The last row blades of the l.p. shaft are secured by means of a "fir-tree" root broached axially. To prevent water erosion on the last rows of moving blades, tungsten steel shields are brazed along the leading edge of each blade. Segmental, spring-backed glands are employed throughout the turbine, the packing steam supply being fully automatically controlled.

Two steam chests are employed, one on each side of the h.p. turbine, the chests being of forged construction. Each chest contains a combined stop and emergency valve and two governor valves. Intercepting valves are fitted in the steam lines between the reheater and the first i.p. cylinder to prevent the steam stored in the reheater from flowing into the turbine when sudden loss of load occurs. Reheat emergency stop valves are also provided as a safeguard against the possibility of faulty operation of the intercepting valves.

Each alternator has a maximum rating of 100 MW at 13,800 V at 0·85 p.f. The h.p. line alternator is driven at 3,600 r.p.m., and the l.p. line alternator, which has a four-pole field system, is driven at 1,800 r.p.m.

To facilitate transport, the stator for the low-speed alternator is manufactured in two parts; the inner part comprising the frame, core, and windings weighs 100 tons, while the outer part consisting of the outer casing and gas coolers weighs 63 tons. The stator for the high-speed alternator is of single-piece construction having a total weight of 135 tons.

Each stator winding is of the basket or diamond coil type. The portion of the conductors lying in the stator slots is insulated with a flexible micanite tube, this construction permitting relative expansion of the conductors and the stator core.

The rotors for both alternators are machined from single forgings of chrome-molybdenum steel; radial slots milled in the body and insulated with troughs of epoxy-resin glass-fibre laminate, receive the windings which are of silver bearing copper strip. Cooling of the rotors is effected by means of sub-slots machined below the normal winding slots and fed at each end with hydrogen. The cooling hydrogen comes into direct contact with the copper, removing the heat direct.

Each hydrogen system is operated as an independent unit, controlled by its own hydrogen cubicle, which contains all the valves and instruments necessary for the normal operation of the alternator. These controls include measurement of the gas pressure and temperature which are automatically maintained, and of the gas purity which is usually adjusted at about 96 per cent. The hydrogen is prevented from escaping through the annulus around the rotor shaft by special oil seals mounted between the stator end-covers and the bearing pedestals. The excitation for each alternator is supplied from separately motor-driven exciters.

Assembly of the low-speed generator stator

The National Coal Board in 1957

THE National Coal Board ended last year with a net deficiency of £5,300,000, and Sir James Bowman, chairman of the Board, has stated that they faced "very serious losses indeed" this year if special economy measures were not taken.

The Board's annual report and accounts for 1957 record that demand for coal fell by 5,200,000 tons during the year, whereas the total output of coal increased by 1,400,000 tons. The fall in demand was occasioned partly by the lower consumption of all the main classes of consumers except power stations and coke ovens and partly by the higher average temperature, which is estimated to have accounted for at least three million tons.

Power stations used about 45,000,000 tons of small coal in 1957, but the increase of 900,000 tons over 1956 was lower than in recent years. This is attributed to the fact that sales of electricity were only 4 per cent higher than in 1956, that more oil was used in place of coal, and that there was a continued improvement in the efficiency of new generating plant. As a result of arrangements with the C.E.A. to increase their normal stock-holding, stocks at power stations were 900,000 tons higher at the end of 1957 than at the end of 1956. During the year the average pithead price of coal supplied to power stations increased by 5s 1d per ton to 68s 4d per ton. This was lower than the average price paid by any other class of consumer, but the different prices are stated to be mainly a reflection of quality and size of coal.

The decision to reduce the number of power stations being converted to oil-burning will mean that the electricity supply industry will now be using oil equivalent only to 5,500,000 tons of coal in 1965, instead of 9,000,000 tons as originally planned. The slowing down of the nuclear power programme will also have the effect of increasing the use of small coal in 1965 by some four million tons over what it would otherwise have been.

Capital expenditure by the Board in 1957 was £103 million, £7 million more than in 1956. The number of power loaders in use during the last quarter of the year was 1,200, which was 300 more than in the corresponding period of 1956. The output cut and loaded by machines went up by over 18,000,000 tons to nearly 55,000,000 tons. By the end of 1957, 228 major colliery reconstruction schemes had been approved at a cost of £560 million and 62 major schemes approved since vesting date had been substantially completed. Complete electrification is recognised as being usually the most efficient and economical way of providing power at collieries, and the Board has continued to electrify those collieries which are expected to remain in operation for a long period.

Network Analyser

Simulation of System Electrical Conditions by Transformer Voltage Outputs

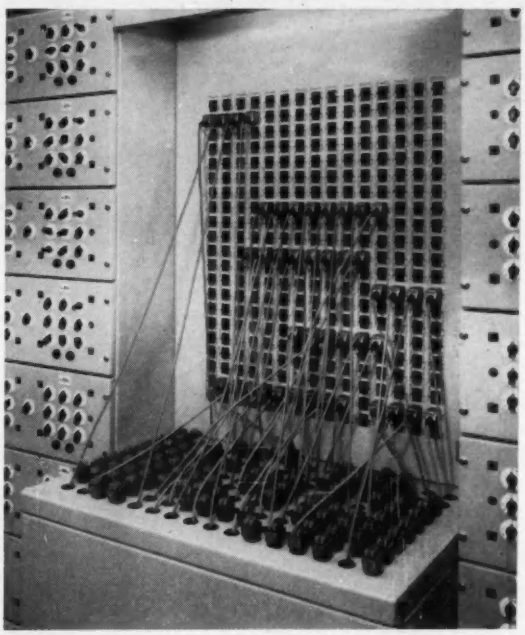
LAST week we saw demonstrated at the Witton Works of the General Electric Co., Ltd., a network analyser which has been developed by the company at an overall cost of about £35,000. Although this equipment is described as the first of its type in the world, there is a strong link in principle with the network analyser developed before the war in Newcastle by Mr. C. K. Blackburn, in that it employs transformers the voltage outputs from which represent the system conditions instead of the usual combinations of resistances and impedances. This means that the analyser is virtually a transformer analogue computer. It has been named "WINA" (Witton network analyser).

The simulating equipment is made up in four sections with a total of 208 units, each of which contains an arrangement of transformers to give the required conditions in voltage form and an electronic system to afford the necessary amplifications, etc.

The 52 standard analyser units in each section are arranged in racks around a central plug board by which any combination and sequence of the units can be built up to represent the electrical conditions of the system which it is required to simulate. Front sockets are also included in the individual units so that interconnections can be made alternatively in this way and this also makes the plugging possibilities more comprehensive.

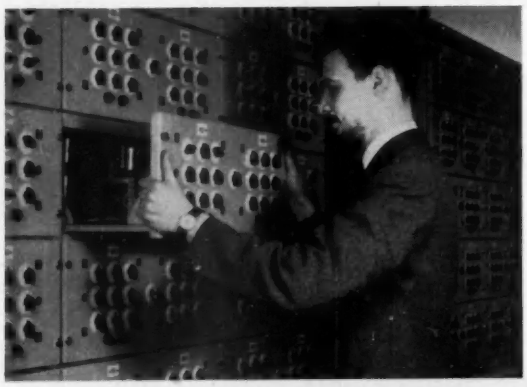
The arrangement of four similar units makes possible four separate studies to be run in parallel. Each analyser unit contains nine multi-position multi-wafered switches which together with compensating circuits and terminal sockets result in a total of 700 soldered joints for each unit. Thus, all told, there are 145,600 soldered joints.

To facilitate wiring, use has been made of a special bonded strip of ten different-coloured plastic covered wires and these strips have been grouped together to run inside Bakelite tubes which keep electrical interference down to the minimum. The control and indicating leads are provided for by 61-core telephone type multi-core cable and the metering leads are channelled in separate screened cables. All the control instruments and metering facilities are housed in a specially constructed wooden



Above : The network analyser is made up of four sections with a total of 208 simulation units, any combination of which can be connected to represent the electrical conditions of the system to be measured

Right : The plug boards, one to each section, enable any sequence or combination of units to be arranged



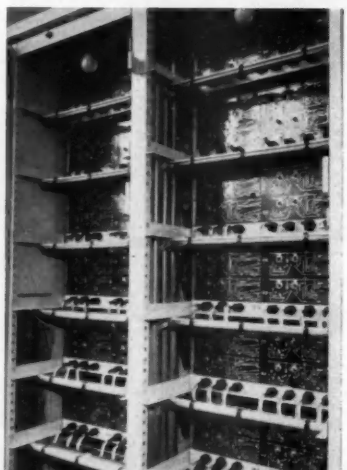
Any one of the units is easily withdrawable

control desk at a central position in front of the simulation sections.

The ultimate accuracy of the analyser depends upon the degree to which the apparent magnetising currents of the transformers can be reduced, and to this end an electronic circuit continuously monitors the voltage per turn on the transformer and injects into a special compensating winding the required magnetising ampere turns. The overall result is that the currents flowing in the actual transformer analogue network are reduced to a very small value.

The control board provides for two methods of metering. The first is direct metering by which the analogue voltages picked up from the analyser are directly transformed into the normal power system quantities of volt, ampere, watt and vars; this is done by electronic computing and amplifying stages feeding four high quality meters scaled directly in "per unit" quantities. The second system of metering is by a self-balancing bridge which consists of four independent bridge units metering the two co-ordinates of the voltage and current at the required point, and gives an illuminated number display of the results obtained.

Printed circuits have been used extensively for the wiring of the section units



The direct and bridge metering are housed in two halves of the control desk. When metering a unit it is possible to select the voltage from either end of the unit to neutral, or the voltage across the unit.

The following represent briefly some of the applications of the analyser: any size of steady-state circuit calculation can be very quickly solved; any expected order of polynomial with real or complex routes or large tedious equations needing repeated solutions can, in general, be accommodated; the steady-state and stability behaviour of any large power system can be fully studied as depicted in the following: distribution of watts and vars; effects of alterations and additions to transmission networks and means of reducing system losses; prediction of synchronous capacitor requirements and tap changing transformer requirements and ratings; steady-state stability limits and dynamic behaviour of rotating plant during disturbances; current and voltage distribution for all types of single or multiple fault conditions; general machine equivalent circuits or the direct and quadrature axis equations can be used; frequency response curves can be obtained to determine the stability of the system; non-electrical analogue problems such as critical speeds of rotating shafts can also be solved.

Non-Ferrous Metals

THE recently issued annual report for 1957 of the British Non-Ferrous Metals Research Association refers to the increased income received which, while enabling new lines of research to be undertaken, such as in the field of nuclear energy instrumentation and the fatigue of structures, is being used mainly to provide urgently needed extra space for the existing work of the various sections of the Research Department.

The equipment of the seriously overcrowded foundry is now being re-located to improve its effective use. A newly-acquired 600 lb Ajax-Wyatt low frequency furnace which has been used under extremely cramped conditions for some months will now be properly housed and the study of refractories for this type of furnace speeded up. The following notes refer to some of the researches undertaken during the year.

A new method has been developed to get rid of lead and tin when fire refining copper, particularly wire and cable scrap. It has halved the furnace time from two days to one and has reduced the amount of copper entering the refining slag from about 5 per cent to 1½ per cent of the charge weight.

A unique survey of furnace operating economics has been carried out. Fuel costs, melting losses and metal quality were studied in a number of foundries using a variety of furnaces. The survey has enabled some of the more important criteria in the selection and operation of furnaces to be pin-pointed and suggests that many foundries are using their furnaces with considerably less than optimum efficiency.

Work on the permissible limits of suphur in gunmetals and phosphor bronzes is being followed by a similar study of the effects of antimony, arsenic and iron. With the high sulphur content of the cheaper fuel oils, sulphur pick-up is inevitable, but no evidence has been found that this is harmful and the tight limits in many foreign specifications seem to be unnecessary. The high strength aluminium casting alloy L53 is being studied with a view to securing the optimum combination of strength and resistance to stress corrosion.

Modern press-work production with wrought copper alloys makes exacting demands on the supplies of brass and copper for strip, for close control over thickness and freedom from "edge bow" along the length to ensure free running through multi-stage presses. A simple and satisfactory way of preventing "edge bow" is being developed and semi-scale plant for demonstrating its applicability to coils of different materials is approaching completion. Researches on the working of copper alloys include studies of rolling loads, "shape" of rolled strip, and lubricants for wire drawing.

Electrical Contractors at Folkestone

18th—20th May, 1958

Photo: Aerofilms

1.—*At the Registration Office: Miss Stirling, Mrs. Wathes, Mrs. Penwill, Mr. L. C. Penwill (Director and Secretary) and Mr. H. S. Wathes (President).* 2.—*Mr. and Mrs. C. J. Veness and Mr. and Mrs. V. J. Stock.* 3.—*Mr. and Mrs. J. G. Briggs with Mr. and Mrs. J. F. C. Prosser*

THIS year's annual conference of the Electrical Contractors' Association and its allied organisations (the National Federated Electrical Association and N.E.C.T.A., Ltd.) was held this week at Folkestone. Most of the 500 or so members and guests assembled at the Metropole Hotel on Sunday evening for a "Get Together," when the President (Mr. H. S. Wathes) and Mrs. Wathes circulated among the company.

On the following morning at the Leas Cliff Hall the delegates were welcomed by the Mayor of Folkestone (Councillor L. V. Fowler) who recalled that this was the third Conference held there by the E.C.A. The President thanked the Mayor in felicitous terms. The presidential address followed, an abstract of which appears below, and after its delivery Mr. A. V. Milton expressed the members' thanks to Mr. Wathes, whom he described as "lively and forthright".

Presidential Address

IN his introductory remarks the President expressed his appreciation of the hard work put in by the honorary officials of the Association, at the same time regretting that attendance at regional conferences and branch meetings was not much higher.

Dealing with labour relations, he reported that although many problems had been tackled by the Association's negotiators there had been no strikes at the national level. There had been bitter disagreement on apprenticeship matters. Over the years the Association had provided a training ground from which all sections of industry and Government Departments had drawn their skilled craftsmen. Apprentices had been encouraged by a scheme of awards and members of the Association had undertaken the correction of City and Guilds examination papers. It was unfortunate, therefore, that their motives had been so unkindly misinterpreted when they had sought a revision of apprenticeship training arrangements, with a view to improving them.

They had given much thought to the problems arising

The President speaking at the opening session. On his right are Messrs. A. V. Milton, C. C. Hyams and the Mayor of Folkestone; on his left Messrs. L. C. Penwill, J. G. Briggs and V. J. Stock

as a result of the Monopolies Commission and the Restrictive Trade Practices Act. They, and industry as a whole, were trying to create a new trading structure which would provide for the needs of all concerned and at the same time would be above criticism from the point of view of the restrictive legislation. To his mind there was only one yardstick by which to measure the margin required to operate a business—whether manufacturing, wholesaling or contracting:—Was it adequate to provide the service required of it, and to provide a profit commensurate with the capital investment, after allowing reserves for future development?

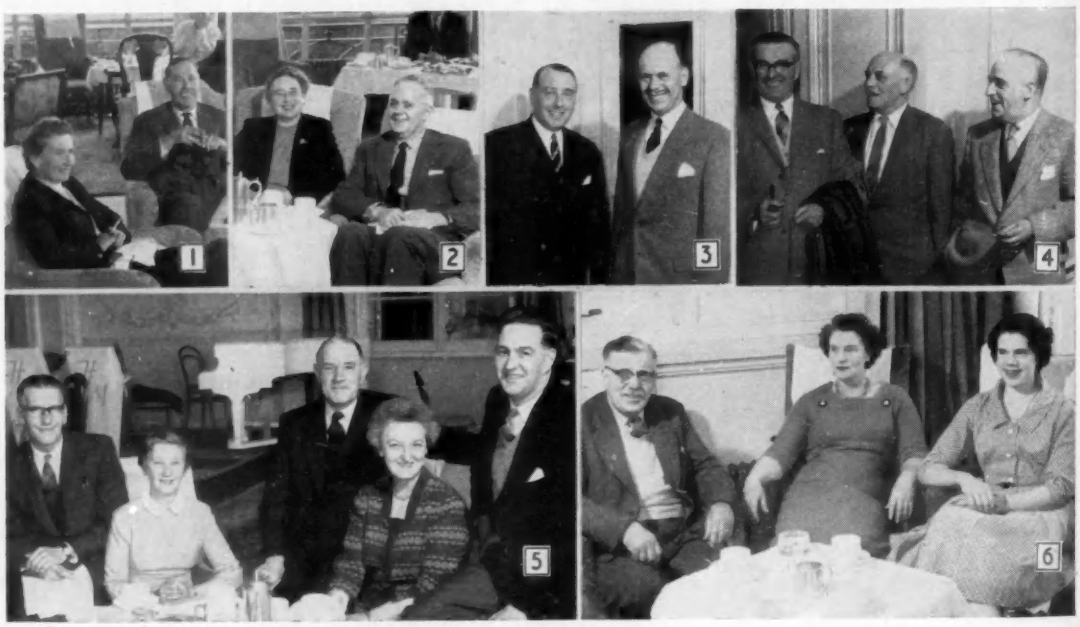
In view of the implications of the European Common Market the Council had felt that it should continue to support the International Association of Electrical Contractors, at least for the next two years.

Mr. Wathes mentioned the anxiety of the Association to co-operate with other sections in electrical development, particularly referring to the campaign to secure more adequate installations and to the work of the National Inspection Council.

The orderly distribution of electrical products was vital to the success of the industry and the service of the public. The Fair Trading Policy, as it now existed, needed drastic revision, particularly in the field of distribution. It was essential to establish that only those engaged in the trade were entitled to the trade discount and an assessment should be made of what was a fair and equitable trade discount to ensure the lowest price to the public consistent with a fair reward for the efforts of the distributors.

In labour matters the Association sought to preserve the principle of "standard" rates and conditions. It urged that

1.—*Mr. and the Hon. Mrs. A. F. Plummer.* 2.—*Mr. and Mrs. S. C. Sutton.* 3.—*Messrs. H. A. Partridge and L. A. Mills.* 4.—*Messrs. W. T. Trace, A. V. Milton and S. Dickinson.* 5.—*Mr. and Mrs. A. G. Gibbs, Mr. and Mrs. M. W. Searle and Mr. G. T. Dinsdale.* 6.—*Mr. and Mrs. S. V. Wise and daughter*



employers of other trades who employed electricians should observe the N.J.I.C. rates and conditions and not cause embarrassment and friction in the electrical contracting industry by introducing other wages and conditions. Mr. Wathes made it clear, however, that the Association was not opposed to extra payment for extra skill and responsibility.

It was a matter for regret that production in the industry was substantially below the pre-war level. A combined effort by the employer and his operatives was vital to secure a drastic improvement.

As a result of unsatisfactory relationships between industrialists and employees in the past the trade unions had almost secured a stranglehold on the country. This could only be released by a slow process of education of the mass of employed persons in ordinary business economics. That education must be accompanied by encouragement to take part in managerial discussions and co-operation on these lines must receive financial reward. A great problem was created in industrial relations by the increasing size of units which made two-way communication difficult. In his own relatively small organisation a great deal of attention was paid to the subject. Everyone was encouraged to take a personal interest in the business and initiative, energy and efficiency were rewarded in terms of hard cash. Decentralisation of control was essential and constructive criticism was encouraged. They did not, however, tolerate destructive criticism. He had ample evidence that this policy was achieving good results.

Success or otherwise was very much in the hands of individual trading concerns. They had to recognise that the interest of all those engaged in the industry was a common one; they must be interested in the prosperity and problems of the manufacturer whose goods they bought and they could then expect reciprocal treatment. The same applied to relationships with the Electricity Council and the Area Boards with whom, almost without exception, they worked in the closest harmony for the good of the industry and the general public.

Mr. P. G. Wallis, Mr. R. L. Lowe, Mrs. Lowe, Mrs. Wallis, Mrs. Thompson and Brigadier W. G. S. Thompson

Mr. Wathes considered that one of the contractors' greatest weaknesses was that they sold themselves too cheaply. Too much of the money which should be retained for development was frittered away in uneconomically low tender figures and in equipment and appliances disposed of at prices below the manufacturers' list.

On the merchandising side there would be ever-increasing competition from large stores. If they were to survive they must provide the facilities for point-of-sale display and demonstration at least on a comparable scale. They must be bold in advertising and active in sales training; otherwise the domestic electrical appliance business would pass out of their hands. He was sure that in this matter the electrical contractors would have the manufacturers' support.

The President then stressed the importance of correct

1.—The President and Mrs. Wathes with Sir Henry and Lady Self and Mr. Penwill. 2.—Mr. and Mrs. J. H. Boardley. 3.—Messrs. H. V. Newton and J. E. Denley. 4.—Mr. J. E. Tonge with Mr. and Mrs. J. A. Hall. 5.—Messrs. A. Escott and C. W. Edwards. 6.—Mrs. H. Harding, Mrs. H. S. Stansbury, Mr. H. S. Stansbury and Mr. H. Harding. 7.—Mr. R. Wilkinson, Mr. D. J. Hastings, Mrs. Hastings, Mrs. L. A. Blount and Mr. Blount. 8.—Messrs. H. Jameson, Vernon Ferens and A. S. Lowrey

accountancy methods and budgetary control. He concluded with expressions of gratitude to all those who had helped him during his year of office.

Visit to Chilham

The weather, although not perfect, was good enough to permit an arranged visit to Chilham Castle, a few miles from Canterbury, to be carried out and the visitors enjoyed tea in the Castle's beautiful grounds.

On Monday evening the delegates were the guests of the Mayor at the Leas Cliff Hall and had a most enjoyable time dancing and witnessing an excellent cabaret, as well as participating in an ample buffet supper.

Off-Peak Space Heating

THE conference paper, referred to below, was presented by the author at the morning session on Tuesday at the Leas Cliff Hall.

Mr. E. Harrison, A.M.I.H.V.E., M.Inst.F., dealt with the subject of off-peak electric space heating. He pointed out that off-peak space heating was not new. Hot water thermal storage systems had already made headway before the introduction of the newer methods of block type thermal storage heaters and floor warming. The principal difference between the older and later systems was that with the former the heat could be stored indefinitely and released when required, whereas the newer methods began to emit heat shortly after switching on and the whole of the stored heat must be released in a matter of hours.

The design of such systems thus involved consideration of the intermittent heating and cooling of buildings and similar matters which were normally ignored in the design of conventional continuous heating installations. The purpose of the paper was to offer guidance on the design of such systems.

The warming of the air was only a means of limiting the rate of heat loss from the occupants of a room. The author, therefore, went into details of the mechanism of bodily heat in various atmospheric conditions and activities. It had been established with reasonable certainty that the human body was approximately equally sensitive to air and to the temperature of the solid surrounding surfaces, which meant that the warmth of a room could be specified approximately as the arithmetic mean of the air temperature and the "mean radiant temperature. The M.R.T. was that uniform temperature of an imaginary enclosure which radiated the same amount of heat to the human body or measuring device as did the actual enclosure with all its varying surface temperature. Thus a room in which the air was at 70 deg. F and the M.R.T. 60 deg. F would have a comfort temperature of about 65 deg. and so would a room in which the M.R.T. was 70 deg. and the air temperature 60 deg. It was thought, however, that environments in which the M.R.T. was slightly higher than the air temperature were generally pleasanter or more stimulating.

Mr. Harrison presents his paper

Individual requirements varied but in this country it was usual to specify a room temperature of 65 deg. F. It was necessary to make adjustment for any increase in air velocity.

Considering the question of temperature measurement, the author said that in order to measure the comfort of a room directly the thermometer should have a relative sensitivity to radiation and convection comparable with that of the human body; that is it should measure in still air the arithmetic mean between air temperature and M.R.T. He described the globe thermometer which would achieve this; it consisted of a hollow 6in. diameter sphere coated with black paint and containing an ordinary thermometer at its centre. It was necessary, however, to apply certain correcting factors to secure the proper comfort temperature.

Mr. Harrison then proceeded to the calculation of building heat losses, usually worked out by a conventional method using standard values for the rate of air change and for the thermal transmittance of each wall or other part of the enclosure which lost heat to outdoors. He drew attention to the variations to be taken into account.

He next touched upon building cooling rates which depended largely on the ratio of the stored heat in the structure and contents of the building to the hourly rate of heat loss. This "time constant" (Q/U) was the number of hours the heating system would have to run at normal full load rate to supply a quantity of heat equal to that stored in the structure at its normal operating temperature. Examples were given of the application of this time constant.

It was shown that to maintain acceptable comfort the occupied period with the heating off should not exceed one-fifth of the time constant of the building and thus no building with a time constant of less than 40 hours should be heated by off-peak electricity without a mid-day boost. If a mid-day boost was provided and the maximum intermission of the supply during the period of occupation was four hours, the time constant of the building should not be less than 20 hours. This assumed an initial temperature of not more than 69 deg. F and a final temperature of not less than 62 deg. To maintain conditions in severe weather the

Above: Mr. and Mrs. F. Burton with Mr. and Mrs. R. H. Phillips. Below: Mr. and Mrs. E. R. Longley and Mr. and Mrs. F. G. Whareham

1.—Mr. and Mrs. J. Fulton with Mrs. C. R. Waterhouse, Mr. and Mrs. R. Cutts and Mr. and Mrs. F. L. Smith. 2.—Mr. and Mrs. Stanley Watkins. 3.—(Front row) Mr. L. Coope, Mrs. W. Winstanley, Mrs. Coope and Mr. W. Winstanley and (back row) Mr. and Mrs. T. Pitts 4.—Mr. and Mrs. S. L. M. Barlow. 5.—Mr. and Mrs. Colin Campbell. 6.—Mr. and Mrs. F. H. Houghton with Mr. and Mrs. A. J. K. Parker. 7.—Mr. J. D. Green and Mr. and Mrs. J. F. Cobb. 8.—Mr. and Mrs. K. S. Estlin

1.—Mr. and Mrs. Ivor Williams, Mr. and Mrs. W. J. Bird and Mr. and Mrs. D. L. Tabraham. 2.—Mr. and Mrs. E. G. Plucknett. 3.—Messrs. H. B. Davies, E. Evans and E. R. Major. 4.—Mr. C. E. Masterman and Mr. and Mrs. G. D. Mason. 5.—Mr. and Mrs. E. Peacop. 6.—Mr. A. S. Shier, Mrs. J. F. C. Prosser and Mr. and Mrs. W. C. Huston

Messrs. C. C. Hyams and S. C. Sutton

installed load would have to be greater than the designed heat loss.

Stating that the floor surface temperature would rise, perhaps to 87 deg., at the end of the input period, the author said that it was important to ensure that the floor finish used remained satisfactory and that carpets and furniture were not adversely affected; the flooring manufacturer should be consulted.

The method of calculating the emission from a heated floor was given in the paper and attention was paid to the thickness of screed required to provide sufficient thermal capacity without over-heating. The principal factor was the loading; as examples the author recommended a minimum thickness of 3in. for a loading of 15W/sq. ft. and 4in. for ground floors, even with a lower loading. Where the rooms were occupied while the supply was on 1½in. to 2in. of screed and lower loading were acceptable.

To minimise downward heat loss the edges of all floors should be insulated but overall insulation, while a desirable aim, was governed by circumstances such as cost and convenience. The conductance values of various insulating materials were given.

Mr. Harrison showed that while a continuous heating system could be controlled by a simple room thermostat or by an outdoor thermostat, the problem with off-peak systems was to regulate the input during the preceding night so as to meet the probable demand during the following day. The essential requirement was to limit the supply period to the number of hours necessary for each value of outside temperature. This intake period should be at the end of the off-peak supply period so that, ideally, the system would remain switched off during the earlier hours of the night except when the weather demanded the use of the full supply period. An arrangement for achieving this was described and illustrated.

In his conclusions the author showed the results obtained from methods designed on a lower standard frequently adopted, to indicate the desirability of working to a more conservative standard which could be guaranteed and would give the client satisfaction.

Discussion

Opening the discussion, Mr. S. L. M. Barlow said that special considerations made purely off-peak heating unsatisfactory. Supply authorities should produce a tariff catering for both off-peak and supplementary heating. He also referred to possible floor damage. Mr. Harrison said that an entirely off-peak system might be inevitable although supplementary heating was often desirable. Danger to floors could be taken care of by a high-limit thermostat.

Mr. J. D. Furse thought that a 4in. screed seemed to ignore the capacity of the concrete floor. Difficulties had occurred with regard to the adhesion of screed to floors. Mr. Harrison replied that his recommendation was perhaps unusual, but once temperature was attained there was a loss from the edges. He recommended insulation under the screed. He had not met any cases of non-adhering screed.

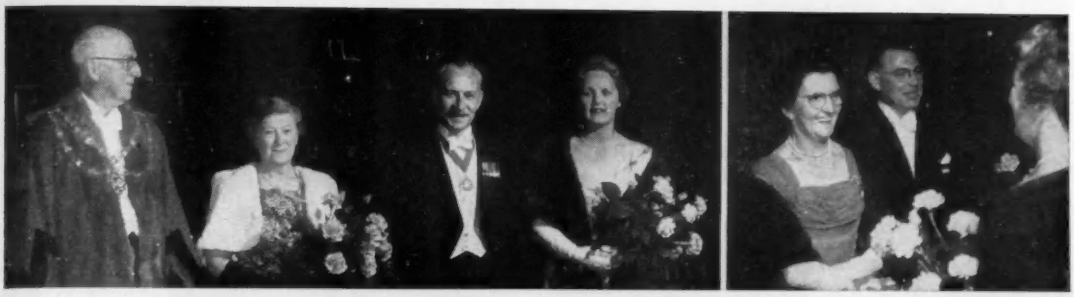
Mr. F. W. Blanshard said he had had satisfactory results from storage systems with simple thermostatic control. He was sorry the author had not dealt with the comparative advantages of embedded and withdrawable floor heating systems. There was little risk of fire with a properly controlled system. The author replied that the choice of installation was a purely electrical matter.

Mr. G. F. Bedford questioned whether a floor heating system without a mid-day boost was satisfactory. The London Electricity Board would not permit a boost; the electricity suppliers' attention should be drawn to the paper.

Mr. J. H. Boardley asked if a thermostat and Mr. Harrison's controller would be suitable for old people's homes. Mr. Harrison said that in such buildings and flats there might be an over-riding manual control. If merely background heating was being provided the client should be told.

Mr. A. V. Milton asked if background heating was not best applied in domestic premises on account of the cost to the tenant. He also asked how air velocities were calculated. Mr. Harrison replied that floor heating in

Left: Mr. and Mrs. R. H. Gill. Centre: Mrs. E. W. Dolman and Messrs. S. Goodman and E. W. Dolman. Right: Mr. and Mrs. R. B. Hill



Left: The Mayor and Mayoress with the President and Mrs. Wathes. Right: Mr. and Mrs. C. R. Waterhouse

Left: Mr. and Mrs. A. H. Young being received by the President and Mrs. Wathes. Centre: Mr. and Mrs. J. Mortimer Hawkins. Right: Mr. and Mrs. J. E. Russell

blocks of flats was attractive from some points of view but there was the problem of loss to the flat below. Some air movement was desirable and it could be measured with ordinary instruments.

Mr. Hill asked if floor warming was the most efficient method of central heating. Mr. Harrison, in his reply, said that efficiency needed definition; insulation was an important factor.

Mr. R. A. Joseph said that the paper should be studied in conjunction with Messrs. Moule and Stevenson's recent I.E.E. paper. When comparing floor warming with other forms of heating its advantages in draughty situations were very great. Mean ground temperature rather than outside air temperature should be employed as a criterion. The thermal capacity of good dry ground was useful in floor heating. The author said that floor heating could not be very effective with large air movement when high temperature radiant heating should be employed. He thought that air temperature was the more satisfactory guide than earth temperature. With intermittent heating the downward losses were great and underneath insulation should be used to save energy.

Mr. King said that most buildings had insufficient thermal storage capacity. The heating engineer specified a definite temperature rise and it was economic to provide extra heating for abnormal conditions. Off-peak tariffs would not encourage domestic floor heating, but it must be remembered this form of heating was not necessarily an off-peak load.

Replying to Mr. W. E. Mannin, Mr. Harrison said there were several satisfactory floor finishes for offices; he thought that synthetic wood blocks, linoleum or rubber tiles were generally satisfactory.

Mr. R. A. Marryat thought that a uniform system of heating was not the best form; he suggested that a heated strip 5ft. wide round the edges of the room would serve better. But the author thought that all the floor space available was needed. Perimeter heating would not generally be sufficient.

Other speakers were Messrs. Bostall, T. Pitts, F. Williams, R. H. Gill and A. V. Moon. The President concluded the morning's session by thanking Mr. Harrison.

The New President

C. C. Hyams

Mr. C. C. Hyams, the new president of the Association, is the proprietor of the firm of Albert Geall, Hove. He was born at Brighton in 1911 and went to Varndean School. His earlier inclinations lay chiefly in the direction of audio engineering and this is still one of his main interests.

Mr. Hyams entered the electrical contracting industry in 1946 when he acquired his present business from an old family friend. He joined the E.C.A. and became assistant secretary of the Brighton Branch in the same year. In 1947-48 he was honorary secretary and in the following year was elected vice-chairman; he was chairman of the branch from 1950 to 1953. Since 1947 he has been a delegate to the South Eastern Sectional Council. He became a member of the E.C.A. Council in 1949 and had been a vice-president since 1956. His hobbies are photography and music.

The audience at Tuesday's "Questions and Answers" session

Contractors' Problems

TUESDAY afternoon's meeting was given over to a series of questions which had been sent in and answers by members of a panel and from the audience. The panel consisted of Messrs. A. V. Milton, C. C. Hyams, H. S. Wathes, L. C. Penwill, V. J. Stock and J. G. Briggs.

The first question referred to the dissolution of some trade associations and the relaxation of restrictions by others. It was asked whether contractors thought that it was advantageous for associations to continue.

Mr. Stock said that by acting together the manufacturers had secured orderly trading. The contractors intended to continue their association and manufacturers would find it necessary to do the same, acting sanely and realistically.

Criticism of manufacturers for recognising wholesalers who merely acted as "post offices" and passed on orders was voiced by the next questioner.

During the discussion on this subject, Mr. Penwill suggested specialisation by wholesalers, but Mr. P. B. Etheridge, director of the Electrical Wholesalers' Federation, said that wholesale distribution was largely a local matter and local wholesalers were expected to supply the whole range of goods. Mr. H. Riley, president of the E.W.F., said that his Federation had about 200 members, but the manufacturers recognised eight or nine hundred wholesalers. The elimination of many of these would remove much of the contractors' grievance. Mr. S. L. M. Barlow said that a very large proportion of wholesalers gave trade terms to contractors' customers and Mr. Stock said that he could not agree with "specialisation".

The next matter raised was the small discount allowed to contractors by the Cable Makers' Association, for whom Mr. R. B. Hill said that contractors were the only people who received a discount. The contractors should not object to paying a little for the development work for which C.M.A. members had been responsible. Mr. Hill was supported by Mr. F. E. Everard, but strongly criticised by Mr. C. J. Veness.

The next questioner asked if it was true that under the present arrangement manufacturers were permitted to supply any type of retail shop, not connected with the electrical industry, with lamps at a discount and that these lamps could either be supplied direct or through a wholesaler. He questioned whether this was a wise policy and asked if the Association was endeavouring to obtain an alteration to this agreement. Mr. Penwill said that electric lamps could not be the responsibility in the field of distribution of the electrical contractor alone. What he thought was wrong was the large number of outlets and he advocated that they should be restricted.

Was it an economic or fair proposition for domestic cooker manufacturers to distribute in ones and twos to Electricity Board service centres and allow a quantity discount above the trade discount? If so, why did manufacturers require the private trader to take delivery of at least twelve cookers as a prerequisite to the granting of any quantity discount? Answering these questions, Mr. W. J. Bird said that the major battle in the sale and distribution of electric cookers was the battle between electricity and gas and he thought it reasonable to give something to the Boards who sold a special quantity. He agreed, however, that the present differential might be too great. Mr. Penwill said that if it was economical to distribute to the Electricity Boards and wholesalers in ones and twos, it was equally economical to distribute to electrical contractors and retailers. Mr. Parkinson said that in his area contractors had grouped together to purchase dozen lots.

It was asked whether it would not be better if cable manufacturers listed their mineral-insulated cable at a higher price with a similar reduction if standard lengths were taken. Replying, Mr. S. Bellis said that the new terms for cable involved a revised cutting charge..

Another questioner asked if individual manufacturers and wholesalers repeatedly stated that it was quite impracticable for them to differentiate between the categories of users known as "special large buyers" and "recognised users" and, in fact, both received the terms applicable to "special large buyers". Why then did the Electrical Fair Trading Council perpetuate provisions in its policy which could not be implemented? Mr. W. J. Bird thought it was not impracticable to operate the Policy and his company regarded it as mandatory.

At the conclusion of the proceedings, Mr. Wathes introduced his successor, Mr. C. C. Hyams, and invested him with the presidential badge. Mr. Hyams said that he was not a large contractor; he would like to consider that he was typical of the E.C.A. membership.

At the Grand Hotel on Tuesday evening the President and Mrs. Wathes held a reception supported by the new Mayor, Councillor D. H. Brown, and Mrs. Brown.

VIEWS on the NEWS

By REFLECTOR

DELEGATES to the Electrical Contractors' Association's conference at Folkestone this week were puzzled to see from their programmes that while the civic welcome and reception were given by one Mayor (Councillor Fowler) on Monday, there was a different Mayor (Councillor Brown) at the President's reception on Tuesday. The surmise that one Mayor could not stay the course was corrected by the explanation that the conference was taking place just as the town changed its civic leader. I do not recollect this ever happening before.

A shadow was cast over the Folkestone conference by the news of the death of Mrs. R. H. M. Drake, wife of one of the E.C.A.'s most outstanding past-presidents. Mrs. Drake had been a regular attendant at the Association's conferences and the majority of the delegates knew her well and greatly missed her.

* * *

Lord Chandos, speaking at the E.D.A. luncheon last week, asserted his belief that the derivation of power from nuclear fusion was nearer than scientists at present cared to predict. But surely not so near as the Industrial Reporter of *The People* dared to predict recently. This is the way in which he put it:—

> "Here is news that will dumbfound America and Russia. Britain has leapt right ahead in the race to extract cheap power from sea water. Only a few months ago atomic experts were saying it would be 20 years before any of the Big Three would have a sea water power station in operation. But I can disclose to-day that Britain will start work on the first miracle station in two years' time. The plant will probably begin to generate electricity five years later. That will put Britain 13 years ahead of the field."

Newspaper correspondents are notoriously less reticent than the people on the job who are too factual.

* * *

Passing the other day by the site of the English Electric Co.'s new headquarters in the Strand, where the Gaiety Theatre stood until recently, I was charmed to see a little windowed balcony arranged as a vantage point for "observers." The idea, I believe, originated in America where the interest, or curiosity, of members of the public in excavation or constructional work has been recognised as a social habit to be encouraged. The contractors, Taylor Woodrow, are to be thanked for their consideration —and not least for embellishing their window with flowers.

* * *

A resolution advocating that the nationalised gas and electricity industries should be merged was passed at a recent meeting of the Croydon Chamber of Commerce. Although one member urged that competition between the two services was a good thing, the president, as reported by the *Croydon Advertiser*, said that this competition was costing a lot of money. Another member considered that a merger would cut out "all this nonsense" of wasting money on advertising. This seems to be a strange thing for a member of a Chamber of Commerce to say.

* * *

"Large-scale electrification has taken place and is still proceeding in gas works." This is said by Mr. T. Bryan, B.Sc., A.M.I.E.E., in a paper recently presented before the Midland Junior Gas Association and reported in the *Gas Journal*. Mr. Bryan is Birmingham divisional electrical engineer with the West Midlands Gas Board, and the existence of such a post is significant. Although gas is used in the electrical industry I do not know of any corresponding position either in the supply section or in manufacturing. Referring to the Birmingham works, Mr. Bryan mentions a connected electrical load of about 32,000 h.p.—a sizeable figure. Although the works have their own generators the growth of load has made them inadequate. Mr. Bryan indicates that these generators were installed in the first place because of a certain doubt regarding the reliability of the public supply, which is essential in gas production. But, says Mr. Bryan, "with the provision of more than one supply from the electricity board, the present reliability of supply has been grudgingly accepted."

* * *

I made reference last week to the reluctance of farmers to make full use of the electricity service provided by Electricity Boards. Half a century ago, the *Electrical Review* was quite optimistic about the prospects for rural electrification. In the issue of 22nd May, 1908, illustrated notes on developments in America and Germany appeared; there were pictures of milking machines, a motor-driven chaff cutter and a cream separator. The *Review* said:—

> "It would seem that this mode of extending power business, for central stations situated in rural districts, would lend itself very admirably to consideration. At present the work is in the hands of isolated plant manufacturers, and the initial cost of the generating plant, even if the current can be supplied at a cost of a penny per unit, places it rather outside the consideration of many farmers who would adopt such a system if it could be supplied to them by means of electric service on a hire or hire-purchase system, the cost being carried by a slightly higher charge per unit. It would appeal to them, inasmuch as at present in order to carry out these operations, they have either to buy or hire portable steam plant to drive their machinery during times of stress, inasmuch as hand labour is ruinous for such a purpose on any considerable scale."

Sir Vincent de Ferranti welcoming the delegates

British Electrical Conference

PROCEEDINGS OF MEETINGS AT THE BRUSSELS EXHIBITION

ON Friday and Saturday last the 1958 British Electrical Conference was held within the precincts of the Brussels Universal and International Exhibition under the presidency of Sir Vincent de Ferranti. The technical sessions took place in the "Petit Auditorium" and there were over 250 delegates from the United Kingdom as well as many representatives from overseas countries. The opening session took place on Friday morning and in his address of welcome to the delegates Sir Vincent de Ferranti explained that the purpose of the Brussels Exhibition was to focus attention on the peaceful progress and development that had taken place in the world during the last 50 years and to allow each country to show what it had been able to contribute to the benefit of mankind. Britain's record of achievement was a fine one and the British electrical and allied industries had been foremost in supplying plant and equipment for the service of the world. The present conference was being held to provide a common meeting place for all those concerned with the design, manufacture and utilisation of electrical plant and equipment. The papers which were being read called attention to two things which could promote world prosperity and understanding—the use of nuclear power to provide unlimited supplies of energy, and the extension of submarine telephone cables to bring the peoples of the world closer.

Sir Gordon Radley, director general of the G.P.O., then presented a paper entitled "Communication Between Nations and Peoples." He said that the number of telephones in the United Kingdom had almost doubled since the end of the war and similar increases had taken place in many other countries. Improved telephones were becoming available and manufacturing costs would be reduced by the use of printed circuits in the set; more efficient microphones and receivers would cheapen cabling to exchanges.

The fact that every telephone required an individual connection to its local exchange was largely responsible for the huge investment in telephone plant. High-frequency techniques, providing many speech channels over a single pair of conductors, had reduced the cost of long-distance telephone circuits. Adaptation of such methods, using transistors, might be useful for short distances and lightly loaded routes and ultimately for connections to outlying subscribers.

Electronic switching systems would eventually render electro-mechanical systems obsolescent and in the United Kingdom the G.P.O. and telephone industry had pooled their research and development resources for this purpose. A basic design had been chosen and it was hoped to have the first all-electronic exchange in public service in North London in 1960.

The aim of contemporary research in communications was to enable a call to be made from any telephone to any other telephone quickly, easily and at a reasonable cost. Subscriber dialling on a national scale was an objective in many countries. By 1970 three-quarters of all long-distance calls in the United Kingdom should be dialled by the callers, and plans for international subscriber dialling were being made.

The annihilation of distance as a barrier to intimate conversation owed much to the development of cables providing several hundred speech channels within a single coaxial tube. In many national networks coaxial cables

were now augmented by radio relay systems operating on centimetric wavelengths. Some of those planned would be capable of providing several "broad-band" channels, each of which would carry several hundred speech paths or a television transmission.

Sir Gordon continued by saying that in countries where the communication requirements were less, v.h.f. radio relay systems were used. Radio must continue to play an important part in world communications. To provide for traffic terminating in, or switched through, the United Kingdom, the G.P.O. completed in 1955 a new station for services to destinations mostly beyond Europe. This was the biggest station ever built as a single project and it had been designed to reduce operating costs, all the transmitters being operated and monitored from a central control position.

The first transatlantic telephone cable in 1956 marked the opening of a new era in international communications. The cable was a joint undertaking by the American Telephone & Telegraph Company, the Canadian Overseas Telecommunication Corporation and the British Post Office. Sir Gordon went on to describe the cable and its associated repeaters in some detail and said that the speech channels were spaced at 4 kc/s apart. A recent British achievement had been the design and construction of terminal channel filter equipment which would give practically the same quality of speech transmission with channels only 3 kc/s apart. This meant a potential increase of 33 per cent in the traffic capacity of a cable, and it was likely that all new cables would be planned on the basis of 3 kc/s channels.

Telephone traffic between North America and Europe had increased rapidly since the first inter-continental cable was brought into service. A second cable system of the same type was planned for 1959 with an eastern landing in France. For 1960 Britain and Canada planned a cable which would be a distinct technical advance on the first two transatlantic systems. There would be a single cable providing "go" and "return" speech channels for 60 telephone circuits. Altogether, 90 both-way repeaters would be required between Newfoundland and Scotland. These would be accommodated in fairly large rigid steel housings. Means for handling these housings as part of a continuous cable-laying operation were successfully tried out at sea during February. A new type of deep-sea coaxial cable was also successfully tried. This cable, which was a British development, had a torsionally balanced strength member at the centre of the inner conductor but was without the usual outer steel armouring, unwanted for protection at great depths. It handled more easily than armoured cable and showed no tendency to kink. If it was as successful as appeared likely, the conventional armoured cable would become obsolescent for deep sea work.

The new Canadian cable would transmit a frequency bandwidth of more than 500 kc/s. This was a remarkable increase from the 100 c/s which was the maximum frequency transmitted across the Atlantic by cable before 1956. The use of transistors would ease the problem of power supply to the repeaters. More repeaters would be possible, and a transatlantic cable with sufficient frequency bandwidth for television would become a technical possibility within the next decade.

Sir Gordon Radley speaking on "Communication Between Nations and Peoples"

A film on the transatlantic telephone cable was then shown to illustrate Sir Gordon Radley's paper and after this the delegates attended a luncheon in the Alouette Restaurant in the Canada Pavilion.

Nuclear Power Achievements

On Saturday morning Sir John Cockcroft presented a paper entitled "Nuclear Energy—The Power of the Future." He said that Britain's two years of practical operating experience on the world's first full-scale nuclear power station had shown that the design had been conservative and that a 10 per cent greater output could be comfortably achieved. Calder Hall operated as a base load station for the electricity authority and the operational load factor had been high. The power levels could be increased at the rate of 10 MW thermal per minute, the limit being set by thermal stresses. The usual operational rates were limited to 5 MW per minute, which was just as fast as a conventional power station.

Sir John Cockcroft presenting his paper

Sir John described in detail some of the many investigations which had been made at Calder Hall to provide information for the design of the nuclear power stations which were being built by British industry for the Central Electricity Generating Board. The Calder Hall experience had enabled major steps forward in design to be made. Thus the experience of welding on site the large reactor pressure vessels made from steel plate 2in thick gave the boiler makers confidence that they could fabricate on site pressure vessels of much larger size made from 3in plate. The larger graphite core which could be accommodated enabled the amount of uranium in the fuel elements to be doubled. A further advantage came from the greater wall thickness, since the gas pressure could be raised by about 50 per cent. This, together with an increase of the operating temperature of the fuel elements and improvements in the heat transfer surfaces, had allowed the heat ratings of the fuel elements to be approximately doubled. At Berkeley, Bradwell and Hunterston these two factors had produced a fourfold increase in output over Calder Hall and these stations would have net electrical outputs of between 275 and 300 MW.

This development had been carried a stage further at Hinkley Point. The amount of uranium had been further increased by about 50 per cent and the net electrical output had been increased by 500 MW. This reduced capital costs by about 20 per cent. This process of straightforward engineering development could proceed and outputs of 800 MW were possible, which should lead to a further fall of 10 per cent in capital costs.

When Hinkley Point was commissioned in 1962 the cost

of nuclear power in Britain should equal that from coal-fired stations. Thereafter, nuclear power costs were likely to be the cheaper. Although nuclear power stations would be operated as base load stations, their load factor would fall from 80 per cent to about 70 per cent in the late 1960s. It was essential therefore to achieve a further reduction in capital costs. An advanced gas-cooled reactor was being developed to meet these requirements. It would have sintered uranium oxide fuel elements, probably sheathed in beryllium. The overall fuel costs of this type of station should be about 0·16 pence per kWh. The high ratings, together with the higher operating temperature and improved steam conditions, should enable capital costs to be reduced by a further 20 per cent to £80/kW. When this third generation of nuclear stations was commissioned in the late '60s we should have gone a long way towards meeting Sir Christopher Hinton's prediction that by 1970 the overall cost of nuclear power would be about 0·47d per kWh.

The Authority was now equipped with three powerful materials testing reactors: DIDO and PLUTO at Harwell and DMTR at Dounreay. These had rigs and loops in which the behaviour of materials under irradiation was investigated, so that advance prediction of their performance was available to designers. They were already irradiating in DIDO specimens of uranium oxide fuel elements sheathed in beryllium to study the irradiation stability. They were also studying the CO_2-graphite reaction at the higher temperatures which would be characteristic of the AGR (advanced gas-cooled reactor).

The Authority was also building an extensive new plant for converting uranium ore into metallic fuel elements and would later build a plant for ceramic fuel elements. The chemical separation plant at Windscale would be enlarged to provide a central processing facility for the whole nuclear power programme. By this means very considerable economies of scale would be achieved, since the cost per unit output decreased markedly as the throughput increased. Thus natural uranium Calder type fuel elements should cost £20,000 per tonne, and spent fuel elements would be worth £5,000 per tonne. This took account of the fact that the spent fuel elements would contain rather more than 2 kg of plutonium. This would be recycled, together with some of the depleted uranium, thereby reducing the natural uranium feed by a factor of about three.

Alternatively, the plutonium might be used in small reactors of the PWR (pressurised water reactor) or organic liquid moderated types for use in propulsion units. The potential heat content of a gram of plutonium, worth in future about £5, was equal to that of 1·7 tons of fuel oil, so there was a challenge to propulsion reactor designers. A further use of plutonium was to feed it to fast breeder reactors which after an initial charge of several hundred kg would thereafter produce 50 to 60 per cent more plutonium than they consumed. The world's first large-scale experimental fast breeder reactor would soon be commissioned at Dounreay.

Intensive research was being carried out on the heavy water, gas-cooled reactor. This shared with the graphite moderated gas-cooled reactor the advantage of using natural uranium or near natural uranium fuel. The economic prospects of this reactor were about the same as those of the AGR.

Turning to the prospects of obtaining power by fusion, Sir John said that ZETA was an encouraging first step. At present the energy released by the fusion reactions was less than a millionth of the energy input. They expected, however, to be able to raise the temperature beyond the few million degrees so far reached to tens of millions of degrees. To reach the break-even point temperatures of over 100 million degrees in deuterium and 40 million degrees in a deuterium-tritium mixture were needed. Sir John concluded by saying that he did not think fusion reactors would supplement fission reactors for at least twenty years.

Block Heaters in Domestic Premises

WHEN thermal storage block heaters were first put on the market in their present shape it was felt that they would not be suitable for domestic heating, and they were exempted from purchase tax on condition that they would not be so used. With the pressing need for improving load factor, however, increased attention is being paid to the promotion of off-peak heating in dwellings. In order to explore the practicability and economics of using block heaters, the Utilisation Research Committee of the Electricity Council and Area Boards has approved the carrying out of practical trials, and consent has been obtained from H.M. Customs and Excise to use up to 50 of these heaters for a period of three years.

At the request of the East Midlands Board, Leicester Corporation has agreed to make available 12 houses now under construction. These will be equipped with electric cookers and water heaters, the latter on off-peak supply, and with block heaters in living room, kitchen and hall. In some of the houses new heater models with controllable output will be tried out. Initially, in place of the usual solid-fuel fire with back boiler, an electric fire with coal-imitation effect will be installed in the living room for supplementary use, but at the end of the trial period the individual tenants will be given the choice between solid fuel and direct electric heating (unless the purchase tax situation has changed by that time). Four of the houses will have improved insulation by means of "Fibreglass" in the wall cavities and double glazing of the living room. Provision will be made for continuous load and temperature recording.

Letter to the Editor

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for the opinions expressed by correspondents

B.S.I. Action on Moulded Lampholders

IN your 16th May issue Mr. Stanley, chief technical officer of the British Standards Institution, invites readers to take note of comments in the *B.S.I. News*. During 1954 there was a similar discussion in the columns of the *Electrical Review* and on 16th July of that year I had a letter printed which included: "The latest edition of the I.E.E. Wiring Regulations (i.e. the twelfth) cites B.S. 52 : 1941 as the appropriate Standard, and although there has been a later revision, i.e. B.S. 52 : 1952, compliance still appears to allow the inherent faults of flimsy inner brass insert lining, poor keying and inadequate ventilation to continue."

These faults do not require great technical knowledge for detection and are in fact obvious to anybody with practical experience. Therefore there does seem to be something wrong for the B.S.I. to take so many years to reach these conclusions, and during this time many offending products have appeared.

Edgware. MICHAEL NEIDLE.

PERSONAL AND SOCIAL

News of Men and Women of the Industry

Mr. H. F. Wickham has joined Associated Electrical Industries, Ltd., as a member of the chairman's staff. After service in the Royal Navy he returned to the staff of Simpson, Baker & Co., Ltd., electrical wholesalers. He joined the Electrical Wholesalers' Federation in 1948, and was appointed secretary in 1952. Until he relinquished this appointment he was editor of the *Electrical Wholesaler*. He was appointed deputy secretary of the Electrical Industries Benevolent Association in October, 1956. A founder member of the Electrical Industries Club, he was social secretary from its inception until October, 1957, and remains a committee member.

Mr. H. St.A. Malleson

The increasing complexity of the demands for electronic valves and tubes from Government Departments and industrial users has led Mullard, Ltd., to reorganise the structure of its commercial arrangements in these fields. A new division, to be known as the Government and Industrial Valve Division, has been formed which will mainly embrace the former Communications and Industrial Valve Department and the Government Radio Valve Department. Within the new division four individual product groups will be established with a commercial manager in charge of each as follows:—Electron optical devices: manager, **Mr. J. V. S. Tyndall.** Receiving valves: manager, **Mr. D. R. Rolinson.** Special industrial valves: manager, **Mr. K. F. Gimson.** Transmitting and micro-wave valves: manager, **Mr. P. S. Britton. Mr. H. St.A. Malleson** has been appointed head of the new division.

Mr. H. Chenery, electricity service manager of the Halesworth/Southwold Branch of the Eastern Electricity Board, will be retiring at the end of this month in his fortieth year of service in the electricity supply industry.

Mr. Chenery, after serving throughout the 1914-18 war with the Seventh Suffolk Regiment, joined the old Suffolk Electricity Supply Co. in 1918 at Stowmarket, subsequently serving at Braintree before his appointment in 1939 as manager of the Southwold branch of the East Anglian Electricity Supply Co. He will be succeeded by **Mr. W. R. Hall,** at present manager of the Board's Harleston (Norfolk) electricity service centre, which will be included in the new and larger branch to be composed of Southwold, Halesworth and Harleston with offices at Halesworth.

Mr. C. C. Smith, M.I.E.E., F.I.E.S., city lighting engineer of Liverpool, has been elected president of the Illuminating Engineering Society for the 1958-59 session. He takes office on 1st October next. Mr. Smith joined the Liverpool Electricity Supply Department in 1927 and was a major in the Royal Engineers from 1939 to 1945. He is a past president of the Association of Public Lighting Engineers and a past chairman of the Liverpool Centre of the Illuminating Engineering Society.

The Sun Electrical Co., Ltd., announces changes in appointments at its Leeds and Newcastle branches which are to take place at the end of this month. **Mr. J. Smith** at present combines the duties of northern area manager and Leeds branch manager, but in view of his forthcoming retirement at the end of this year he is giving up executive control at Leeds at the end of May, although retaining his appointment as northern area manager. He is to be succeeded as Leeds branch manager by **Mr. J. T. Simpson,** who is at present manager of the Newcastle branch. Mr. Simpson's appointment at Newcastle will be taken over by **Mr. F. Spence,** who for many years has been an assistant manager at the Leeds branch. Both Mr. Simpson and Mr. Spence have been with the company for twenty-five years, while Mr. Smith has thirty-five years' service.

Mr. E. E. Pheasey, M.B.E., has been appointed works director of Thompson Bros. (Bilston), Ltd. He was previously with Foster, Yates & Thom, Blackburn.

Mr. J. Haynes, A.M.I.E.E., A.M.I.Mech.E., superintendent of Tilbury power station, has been appointed superintendent at High Marnham power station, East Midlands Division, C.E.G.B., and left the Eastern Division on 30th April.

Mr. J. Haynes

Mr. R. R. Belbin

Mr. R. R. Belbin, M.Inst.F., superintendent of Goldington power station, has been appointed station superintendent at Tilbury as from 1st June.

Mr. W. F. Cusworth, B.Sc.(Eng.), A.M.I.E.E., superintendent at Stella South power station, North Eastern Division, C.E.G.B., has been appointed generation engineer (operation) with effect from 1st June next.

Mr. W. F. Cusworth

Mr. Cusworth was apprenticed with the Wallsend Slipway & Engineering Co., Ltd., and during 1941-46 served as a lieutenant in the Royal Navy. In 1946 he joined the staff of the North Eastern Electric Supply Co., Ltd., as shift control engineer and in 1947 was appointed assistant engineer in the Generation (Operation) Department and continued in this position with the B.E.A. at vesting day. He became second assistant engineer in this department in 1950 and in 1951 was made deputy superintendent at Dunston "A" and "B" and Blaydon power stations, being promoted to superintendent in February, 1954. In October, 1954, he became superintendent of Stella South.

Mr. L. A. Fullagar, a technical director of McLellan & Partners, consulting engineers, retired on 31st March, after being associated with the firm for thirty-four years. Two senior members of the staff, **Mr. P. F. Grove** and **Mr. J. V. Peacock,** have been appointed technical directors.

Captain G. J. A. Lumsden, D.S.C., R.N. (Rtd.), has joined the staff of Decca Radar, Ltd., as head of a new sales division, formed to promote the sales of naval shipborne radar, coast defence radar of all types and harbour surveillance radars. Before joining Decca Radar, Captain Lumsden was a specialist in navigation in the Royal Navy.

The Marconi International Marine Communication Co., Ltd., has appointed **Mr. J. W. Dick** as its representative in Singapore. Mr. Dick will shortly take over the company's depot there from **Mr. J. I. Morse,** who is now on leave in the United

Kingdom following an extensive tour of foreign service.

Mr. Dick was educated at Kilmarnock Academy. After training at the Science Museum, he acted as instructor in air radio in the Royal Air Force, and after leaving the service in 1946 was instructor at the Glasgow Wireless College until he joined the seagoing radio officer staff of the Marconi International Marine Communication Co., Ltd. In 1950 he was transferred to the shore staff at the company's Liverpool depot, where he has since been engaged in contracts work.

Mr. C. W. Rawlings, who until 1st May was with the South-West Regional Lighting Department (Bristol) of the A.E.I. Lamp & Lighting Co., Ltd., has been appointed field engineer, street lighting, at the Lighting Department headquarters in London. He is succeeded by **Mr. E. C. B. Morgan,** from Cardiff.

Mr. R. C. Gorringe, who has suffered from ill-health for some time, has relinquished his post as manager of the London Supplies Division branch office of Crompton Parkinson, Ltd., and **Mr. D. G. Bowl,** who was assistant to Mr. Gorringe, has been appointed manager. The new assistant to the branch manager is **Mr. W. F. Griffiths.**

Mr. D. G. Bowl

Mr. Gorringe, who joined the London branch in 1939 as a special sales representative, was soon afterwards appointed chief sales representative at the Manchester branch where he subsequently became manager. In 1948 he returned to the London branch as manager and in 1950 served on the junior board of Crompton Parkinson, Ltd.

Mr. Bowl joined the company in 1932 as a sales representative and was subsequently appointed assistant to the manager at the London branch.

Mr. Griffiths returned recently from South Africa, where he held the appointment of general manager of Crompton Parkinson (South Africa) Pty., Ltd. He joined Crompton Parkinson as a sales engineer in 1950 and held various appointments within the organisation before he was seconded to the South African company in 1955.

Mr. H. G. Meads, a director of Hoover, Ltd., and comptroller of the company's financial and administrative services, has just completed twenty-five years' service and to mark the event Mr. S. Roberts, managing director, recently presented him with a gold watch at an informal meeting with fellow directors.

Mr. James Bailey, A.M.I.E.E., the author of "Pull-Through Windings" (page 961), served a student apprenticeship with Brookhirst Switchgear, Ltd., and later with the English Electric Co., Ltd. In 1930 he joined the Brierfield electricity undertaking as assistant engineer and from 1936 to 1946 he was engineer and manager of the Barnoldswick undertaking. He was then engaged in a private enterprise concerned with industrial electrical and mechanical engineering installations until 1952 when he joined the Air Ministry as a mechanical and electrical engineer. Following a short period in London he assumed responsibility for electrical and mechanical construction at the United States air base at Burtonwood, near Warrington. In 1955 he joined the Michelin Tyre Co., Ltd., Stoke-on-Trent, as company power engineer.

Mr. J. Bailey

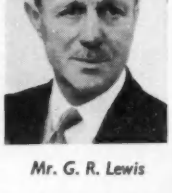
The E.I.B.A. has benefited by £220 from the North West (Manchester) Area qualifying competition of the **Electrical Industries National Golf Championship,** which was held at the Stockport (Torkington) Golf Club on 7th May last. The golf prizes were presented by various manufacturers and many other prizes were given. The prize winners were:—Ferranti trophy, Mr. E. Bowker; runner-up (division 1), Mr. A. O. Johnson; runner-up (division 2), Mr. R. G. Barclay. Best gross, Mr. A. Bailey. Veterans', Mr. F. N. Pardow. Visitors' best nett, Mr. D. I. Clarke. Visitors' best gross, Mr. S. J. Chew. Putting, Mr. R. Thorpe. The 12-hole greensome competition in the afternoon was won by Mr. Clarke and Mr. Thornley.

The Yorkshire Area Golf Competition for the Electrical Industries National Golf Championship will take place on 1st July at the Sand Moor Golf Course, Leeds. The programme will include lunch and dinner. The area organiser is Mr. J. Nicholson, Leeds branch manager of W. T. Henley's Telegraph Works Co., Ltd., 1, York Place, Leeds, 1.

At the meeting of the Council of the London Chamber of Commerce on 13th May **Sir Harold Gillett,** M.C., F.C.A., was re-elected chairman, **Mr. A. L. Stock,** deputy chairman, and **Mr. R. L. Wills,** M.C., treasurer.

Mr. C. T. Rivington, who has edited the *Journal* of the Institution of Electrical Engineers from 1955, when it first appeared in its new form, until last month, has now relinquished the editorship. His place is shortly being taken by **Mr. W. G. Askew,** who joins the Institution staff from an industrial appointment.

Mr. G. R. Lewis, B.Sc.(Eng.), A.M.I.Mech.E., M.I.E.E., has been appointed managing director of Crompton Parkinson (Doncaster), Ltd. He joined the company in 1935 as a contracts engineer and from 1944 to 1949 was the chief service engineer. In 1949 Mr. Lewis became general manager of the Young Accumulator Co., Ltd., Newport, Mon., and in 1954 was appointed general manager of Crompton Parkinson (Doncaster), Ltd. Last year he joined the board of executive directors of the company.



Mr. G. R. Lewis

Readers may wish to note in their diaries that the annual ball of the **Electrical Industries Benevolent Association** will be held on 14th November next at Grosvenor House, London.

Mr. K. H. Frostick has recently assumed the responsibilities of sales manager of the chemical and metallurgical division at Towcester, Northants., of the Plessey Co., Ltd.

The Amateur Dramatic Society of **Siemens Edison Swan, Ltd.,** Woolwich, presented the farce "Strictly Business," by Rosemary West, at the Sports Club Hall at Charlton Park

The president of the Warner Electric Brake & Clutch Co., of Wisconsin, U.S.A., recently visited Westool, Ltd., St. Helen's Auckland, who manufacture Warner equipment in this country under licence. The photograph shows (left to right): Mr. Steve Wood (president, Warner organisation), Mrs. Wood and Mr. A. L. Hunking (managing director, Westool, Ltd.)

Lane, S.E.7, on 3rd, 9th and 10th May. The cast were ably supported by the back-stage staff under the stage management of Tom Camp and the play was produced by Wilfrid D. Cornwell.

Mr. W. D. Sutherland, B.Sc., Ph.D., A.M.I.E.E., has been appointed chief engineer (electrical) of C.A.V., Ltd. Dr. Sutherland studied for his degree at Edinburgh University, and saw war service in 1944-47 as electrical sub-lieutenant, R.N.V.R., after which he joined Ferranti's as development engineer on electro-mechanical devices. From there he went to Glasgow University, where he lectured in electrical engineering for six years, during which time he obtained a Ph.D. degree. He joined C.A.V. as product development engineer (electrical) in 1954, and was responsible for the development of the C.A.V. automatic gear change control equipment some two years ago.

Dr. W. D. Sutherland

Vice-Admiral Sir Charles Hughes Hallett, K.C.B., C.B.E., and **Mr. W. J. Arris,** M.C., have joined the board of the Gas Purification & Chemical Co., Ltd., and the former has been elected chairman.

Mr. P. L. Oliver, F.C.A., and **Mr. J. L. Symonds** have been appointed to the board of Hartley Baird, Ltd.

The North Western Branch of the **Electrical Trades' Commercial Travellers' Association** held its general meeting at the Waggon and Horses Hotel, Manchester, on 12th May. After the meeting a talk was given by Mr. E. Midgley on "Accountancy and Taxation."

Mr. J. O. K. Purdey has been appointed a director of the Benjamin Electric, Ltd. He joined the company as general sales manager in October, 1957, and was previously with the Lighting Sales Division of the A.E.I. Lamp & Lighting Co., Ltd.

Mr. J. O. K. Purdey

The annual outing of the Sports and Social Club of **Dimplex, Ltd.,** was held on 17th May when more than 500 visited the Isle of Wight. Luncheon was served at Ryde, at which Mr. E. J. Wade, managing director, said he thought it was important that they should all get together "off the job" for a while and enjoy themselves. The weather was unpropitious and the Commodore Ballroom, Ryde, was therefore booked for an afternoon party dance. Following tea there was a two-hour coach tour of the island.

The B.B.C. announces that **Mr. F. C. Brooker,** A.M.I.E.E., has been appointed engineer-in-charge, London (Sound), in succession to **Mr. C. E. Bottle,** M.B.E., who has retired after 34 years' service.

Mr. Brooker joined the B.B.C. in 1935 as an assistant maintenance engineer in the London control room. In 1941 he became an instructor in the Engineering Training Department, where he remained until 1948. During this period he wrote the B.B.C.'s first "Engineering Training Manual," which became the handbook for the training of wartime and immediate post-war staff on all aspects of B.B.C. studio engineering practice. Mr. Brooker became an assistant to the superintendent engineer (studios) in 1948, which post he held until taking up his present appointment.

Mr. J. Bell, B.Sc., F.Inst.P., has been appointed manager of the Research Laboratories at Wembley of the General Electric Co., Ltd. Mr. Bell will take charge of the administration of the group of establishments, the responsibility for the scientific policy and programmes remaining with the present director of research, **Mr. O. W. Humphreys,** C.B.E., B.Sc., F.Inst.P., M.I.E.E., who is also director of the Applied Electronics Laboratories of the company at Stanmore.

Mr. J. Bell

The work of the Wembley laboratories has been organised since 1953 in three Divisions: Physics and Applied Physics, Chemistry and Engineering, and Telecommunications. Mr. Bell has been manager of the Telecommunications Division since its formation and retains the leadership of this work in addition to his new responsibility. He joined the laboratories in 1929 and was appointed to its leading scientific staff in 1936. His scientific work has been largely in the field of radio and radar transmitting valves. Mr. Bell was educated at Newtownards Academy and Queen's University, Belfast.

Sir John Maud, G.C.B., C.B.E., M.A.(Oxon), Permanent Secretary to the Minister of Power, has been appointed High Commissioner for Basutoland, Bechuanaland Protectorate and Swaziland, in succession to **Sir Percivale Liesching,** who is retiring from the Service. The appointment will take effect from January next.

OBITUARY

Mr. G. B. Hayward.—The death occurred on 13th May of Mr. Gerald Baldwin Hayward, M.B.E., B.A., A.M.I.E.E., at the age of fifty-three. Mr. Hayward was with the Athens Piraeus Electricity Co., Greece.

Mr. Edmund Arthur Lawson-Brown, service engineer in the Traction Department of the British Thomson-Houston Co., Ltd., at Rugby since 1951, died on 9th May in the Hospital of St. Cross, Rugby, at the age of fifty.

The late Mr. E. A. Lawson-Brown

Mr. Lawson-Brown was educated at Watson's College, Edinburgh, and in South Africa, and received his technical training at Faraday House, London. He joined the B.T.H. Traction Department as service engineer in 1951 on his return from India where he had served for some two years as engineer with the A.E.I. (India), Ltd. Before this he had been assistant transportation superintendent on the Indian Government Railways (Great Indian Peninsula Section). During his service with the B.T.H. Co. Mr. Lawson-Brown paid two visits to Australia and New Zealand in connection with large B.T.H. contracts there.

Mr. Walter Ernest Fowler, A.M.I.E.E., died on 14th May at Herne Hill, at the age of eighty-five. Mr. Fowler was at one time associated with the Chelsea Electricity Co.

Prices of Materials

In the accompanying table we give the basis prices of the more important materials used in the electrical industry. The figures given are the selling prices and are those quoted on Tuesday last.

ALUMINIUM ingots	ton £180 0s 0d
COPPER, H.C. Electro	ton £177 10s 0d
Fire Refined 99·70%	ton £176 0s 0d
Fire Refined 99·50%	ton £175 0s 0d
COPPER Tubes	lb 1s 8¾d
Sheet	ton £205 10s 0d
H.C. wire and strip	ton £226 15s 0d
LEAD, English	ton £72 10s 0d
Foreign	ton £71 0s 0d
MERCURY	flask £76 0s 0d
TIN, block (English)	ton £730 5s 0d
ZINC, G.O.B. Foreign	ton £61 10s 0d
Electrolytic	ton —
BRASS Tubes (solid drawn)	lb 1s 5¾d
Sheet	ton —
Wire	lb 2s 2¾d
PHOSPHOR BRONZE Wire	lb 3s 6¼d
PLATINUM	oz £25 0s 0d
RUBBER, No. 1 R.S.S. spot	lb 21¾—21¾d

INERTIAL NAVIGATION

AGREEMENTS for the manufacture and use in Britain of modern U.S. gyroscopes and for the exchange of development and design information have been signed by the English Electric Co., Ltd., Honeywell-Brown,

Miniature integrating gyroscope to be made by the English Electric Co. under licence from Minneapolis-Honeywell. It is approximately 2½in long

Ltd., and the Minneapolis-Honeywell Regulator Co., U.S.A. This means that the British manufacturers will be able to benefit from American experience without wasting time and money on developments already carried out. The gyroscopes will be made by English Electric's Guided Weapons Division in a specially designed new factory at Stevenage, Hertfordshire.

Minneapolis-Honeywell have, by developing very advanced technical processes, achieved remarkable success in producing very high precision gyroscopes, accurate enough for inertial guidance systems. One of the main difficulties associated with the employment of gyroscopes in accurate instruments is the frictional torque. Developments have concentrated on reducing this type of error. In the American miniature integrating gyroscope type CG49 the gimbals carry no load since the space between the two casings is filled with a liquid, giving the gyroscope container neutral-buoyancy.

The angle between the gyroscope gimbal and its outer case is measured electrically by means of rotating a laminated iron armature inside a laminated iron stator and coil assembly. The electrical outputs obtained from this coil assembly are directly proportional to the angle of rotation of the gimbal system. The accuracy is of the order of 1 second of arc movement.

Most of the individual parts of the gyroscope have to be machined to a tolerance of 0·0001in and finished to a tolerance of 0·000001in. The new English Electric factory has therefore been designed to minimise the effect of vibrations from machine tools and plant as well as vibration due to trains and heavy traffic. Help in the design of this building has been given by Honeywell as a result of their experience with similar premises in Florida which had to be protected from the vibrations caused by the sea breaking against the shore twelve miles away.

British Trade Fair in Portugal

A British Trade Fair is to be held in Lisbon from 29th May to 14th June, 1959. It is being organised by British Overseas Fairs, Ltd., and will occupy the new exhibition hall on the banks of the River Tagus. A total of 125,000 sq ft of exhibition space is available (45,000 sq ft in the hall and 80,000 sq ft in the grounds) and the charges will vary from £11 15s to £5 5s per sq metre. Details of these and a plan of the sites are given in a brochure, "British Trade Fair in Lisbon," 10,000 copies of which have been distributed to British manufacturers and their agents in Portugal.

At a Press conference on Tuesday Mr. W. P. N. Edwards, director of home services and information at the F.B.I., said that Britain was Portugal's main customer and for many years had been her principal supplier. Recently, however, Germany had taken the lead, and it was felt that the time was ripe for a special effort by British industry which, if sustained, could result in an increase in British exports to Portugal of £5-6 million a year. In 1957 British exports of electrical machinery, apparatus and appliances to Portugal amounted to £3·3 million.

A particular reason for holding the exhibition in 1959 was that this would mark the beginning of Portugal's second six-year plan, which covered the expenditure of some £262 million. Included in this was £75 million for power stations and transmission lines, £10 million for the completion of the electrification of the Lisbon-Oporto railway and £5 million for a nuclear energy college.

American Symposium

The 5th National Symposium on Reliability and Quality Control in Electronics will be held from 12th to 14th January next at the Bellevue-Stratford Hotel, Philadelphia, Pa., U.S.A. Although this annual event has hitherto contained papers almost exclusively of United States origin, the organising committee is anxious to make it clear that papers from outside the United States will be welcome. Mr. R. Brewer, of the Research Laboratories of the General Electric Co., Ltd., Wembley, Middx., has been appointed publicity area chairman for the United Kingdom and Western Europe and can supply further information about the symposium and the procedure for submitting papers.

Heat Exchanger for Bradwell

BRADWELL nuclear power station, which is being built by the Nuclear Power Co., Ltd., for the Central Electricity Generating Board, will have two nuclear reactors each associated with six heat exchangers. Because of their size the heat exchanger vessels cannot be delivered in one piece by road or rail nor was it possible to deliver the vessels broken down into rings. The geographical position of the fabricating shops and the site of the power station, both being on rivers on the east coast, offered a solution and the vessels are being completely fabricated in the Thornaby-on-Tees works of Head Wrightson & Co., Ltd., under strict control and for subsequent launching into the river to be towed to the power station site.

The first of the heat exchangers was dispatched from Thornaby-on-Tees on Friday and arrived this week at the Bradwell site where a concrete slipway had been built, down which a road low-loader was run. The vessel was floated into position above this vehicle so that, as the tide fell, the weight of the vessel was taken on the vehicle. This was then hauled out of the river with the aid of tractors and taken to the power station site under the Goliath crane for lifting into its final position.

The first heat exchanger for the Bradwell nuclear power station seen in the water after "launching" at Thornaby-on-Tees

PARLIAMENTARY REPORT

Subscriptions to Professional Societies

Explaining in the House of Commons last week the effect of Clause 14 of the Finance Bill which will exempt from taxation under Schedule E subscriptions to professional or learned societies, Mr. J. E. S. Simon, Financial Secretary to the Treasury, said that fees payable by professional men "as a condition of being allowed to practise" would get clear exemption. But he appeared to give a narrower interpretation of the exemption to be given to subscriptions to other professional and learned societies.

The Chancellor in his Budget speech had said, "Similar exemption will be given to annual subscriptions to professional and learned societies with activities related to the taxpayer's work."

Mr. Simon said that the general test would be whether a society's activities were wholly or mainly of a professional or learned character. Where such a body also had significant activities of a different kind, such as the prosecution of salary claims, the Clause provided for the deduction of a fairly apportioned part of the subscription.

Purchase Tax Changes

During the debate, Mr. Gerald Nabarro made a plea for the ending of purchase tax with its differing rates, and substitution of a uniform, non-discriminatory rate of tax on certain consumer goods. He did not believe that cosmetics, motor-cars, television sets, or radio sets, taxed at 60 per cent, were luxuries any more than a carpet, taxed at 15 per cent, or a commercial motor chassis, taxed at 30 per cent. Purchase tax, he said, was introduced to depress consumption; to-day we were seeking to expand the production of all manufactured goods, and to expand exports it was necessary to have a buoyant home market unhampered by the purchase tax attempt to sort out the sheep from the goats on the basis of what were deemed to be luxuries and what were deemed to be essentials. The flat rate tax, he thought, should be at 15 per cent.

Mr. John Hall indicated that on the committee stage he would oppose the change in purchase tax which removed the exemption on oil space and water heaters and made them subject to a 30 per cent tax with gas and electric heaters.

Mrs. Jean Mann continued her campaign against manufacturers who, she alleges, did not reduce the price of their products to the extent of the purchase tax reductions. She said she went round a big retail store and found that articles in Group 12—certain domestic appliances—had been increased in price on 31st March in an intelligent anticipation of a tax reduction in the Budget.

Replying to the debate, Mr. Heathcoat Amory, Chancellor of the Exchequer, said he was glad that the reductions in purchase tax had been welcomed generally. The reliefs in a full year would amount to £40 million and this would benefit all incomes. Mrs. Mann had complained that some shopkeepers had not reduced their prices as soon as the changes were announced. There was no inherent obligation on a trader to reduce the prices when the tax had been paid. But the forces of competition achieved a great deal in this direction. "In fact," he said, "there have been few complaints that shopkeepers have not reduced prices promptly."

Tax Policy Outlined

When the Finance Bill was considered in committee the Chancellor of the Exchequer (Mr. Heathcoat Amory), replying to a debate on the purchase tax clause, said that the aims of the proposals put forward this year were to reform the tax, to try to simplify and streamline it, and to get rid of at least some of the anomalies and make a move in the direction of a reasonable degree of uniformity. He had not reduced substantially or hardly at all the coverage of the tax because he believed it should be spread over a wide field. If things went as they should there would be a standard rate of 30 per cent, and a higher rate in the case of a number of articles where he had not found it possible to reduce the rate for revenue reasons. Then there would be a lower rate for a range of articles that came into the category of necessities or near necessities. A turnover tax if it were applied on all turnover would not be a uniform flat rate because articles passed through different stages between manufacturer and consumer. Having said that he would go a long way with Mr. Nabarro in desiring a substantial level of uniformity, provided that it was fair and reasonable. An absolutely uniform rate would not fulfil the requirement.

With purchase tax every Government had tried to ensure that the impact of the tax did not discourage exports. That was important. He agreed that purchase tax was a powerful economic instrument. He would be pleased if he could do without it. The purpose of the tax must be to raise revenue, and not to discriminate against an individual's free choice to spend his money as he thought best.

He agreed that the tax in its aggregate yield could legitimately be adjusted from time to time, but not frequently, according to whether one wanted to stimulate or discourage purchasing power at that moment. But it must not lead even in the aggregate to frequent changes in the total raised. What would not be a good plan in his opinion would be to vary the individual rates, even for any short-term change in circumstances. That would lead to chaos in administration.

The clause was agreed to.

Restrictive Trading Proceedings

Sir John Barlow asked the President of the Board of Trade whether he was aware that the Registrar of Restrictive Trading Agreements regarded himself as having no power to withdraw from the Register agreements which had been abandoned before or after proceedings had been commenced; and whether he would introduce declaratory legislation to ensure that an agreement abandoned before proceedings were commenced could be dealt with under Section 12 of the Restrictive Trade Practices Act, 1956, as being no longer an agreement of any substantial economic significance.

Mr. Erroll said there was no doubt that the Registrar's interpretation of his powers was correct. The answer to the second question was "No." The intention of the Act would not be met if agreements which were abandoned were by that fact alone allowed to fall within Section 12.

Export Credit Approvals

Mr. Vaughan-Morgan, Minister of State, Board of Trade, informed Mr. Holt that three-quarters of the applications to the Export Credit Guarantees Department for approvals of amounts which could be shipped to individual buyers under short-term policies were dealt with within three days.

Street Lighting Costs

Sir Ian Fraser asked the Minister of Housing and Local Government if he would consider using his powers, or taking powers, to pay for the lighting of trunk roads from central funds, thus relieving parishes of financial obligations which were beyond their means.

Mr. Bevins, Parliamentary Secretary, replied that the Minister already had powers to make grants for approved trunk road lighting schemes. Parish Councils' lighting powers were permissive and not obligatory.

Purchases of Uranium

Mr. Alport, Under Secretary, Commonwealth Office, told Mrs. Castle that during recent discussions in South Africa agreement was reached concerning the quantities of

uranium to be purchased by the Combined Development Agency, the organisation through which purchases were made on behalf of the United States Atomic Energy Commission and the United Kingdom Atomic Energy Authority. The quantities to be purchased would maintain production at about the present rate. In other respects the contract remained unaltered, except that, in future, any uranium produced in excess of the agreed figure would be available for sale elsewhere. The representatives of the U.K.A.E.A. also had discussions with the South African Atomic Energy Board regarding the Authority's undertaking to buy uranium unilaterally from South Africa. Agreement was reached on the quantity to be bought and the price to be paid.

Nuclear Power in North Scotland

The Secretary of State for Scotland (Mr. J. S. Maclay), replying to Mr. Hector Hughes, said he was aware that the North of Scotland Hydro-Electric Board was considering the suitability of various sites for a nuclear generating station should one be required in its area. Test borings had been carried out at Crimond and the Board was examining the results but had not yet submitted any proposals to him on this matter.

European Free Trade Area

Mr. H. Hynd asked the Paymaster General what progress he had to report in the negotiations for the establishment of a European Free Trade Area.

Mr. Maudling said the Government were awaiting the document which the six countries of the European Economic Community were preparing on the basis of French proposals. In the meantime useful work was proceeding on a number of important details.

Raw Material Prices

Mr. Osborne asked the President of the Board of Trade if, in view of the fact that rubber had dropped to 1s 9d per lb in the United Kingdom, the lowest price for four years, and that the prices of metals, like copper, tin, nickel, and aluminium had been maintained only by drastic cuts in production, he would explore the possibility of calling a special conference of all industrialised countries in order to produce some stability in raw material prices.

Mr. John Vaughan-Morgan, Minister of State, replied that the Government's attitude to this important problem was fully explained by the President of the Board of Trade in his speech in the Budget debate on 16th April. He added, in answer to a further question, that the Government did not exclude the possibility of stabilisation arrangements for particular commodities. But it had to be remembered that the International Tin Agreement took many years to achieve. The basic problem was a general one of maintaining a high and stable level of world demand.

Safety of Electrical Appliances

In answer to Miss Burton, Mr. F. J. Erroll, Parliamentary Secretary, Board of Trade, said that the Joint Committee of the Electrical Development Association and the British Standards Institution on the safety of electrical appliances and accessories was set up after the war to test and advise on cases submitted to them where there may be doubt with regard to safety. He understood that no development of the work of the Committee was contemplated; it would continue to operate as at present.

Miss Burton said this was exactly what she feared. "The Consumer Advisory Council of the B.S.I. has been pressing for a long time for a 'kite mark' scheme on this range of appliances," she said. "Can the Minister give any indication whether that is likely to materialise?"

Mr. Erroll said he could not, but he would make inquiries.

Alkali Works Order

Moving the annulment of the Alkali Works Order, 1958, which will transfer from the local authorities to the Alkali Inspectorate responsibility for discharges from certain industrial chimneys, including those of power stations, Mr. Nabarro said that many of the large local authorities in industrial areas were firmly opposed to the loss of powers implicit in the Order.

Mr. R. E. Winterbottom said that Sheffield had five fully-qualified inspectors to deal with smoke, grit, dust and fumes, and was helped by the university. The Minister would not have enough officers to deal with this problem.

Replying, Mr. Henry Brooke, the Minister of Housing and Local Government, said it was only when the Order came into operation and registers of the works to come under the Alkali Act came to be compiled that the large local authorities could be sure that they were well enough equipped with a full-time smoke inspectorate. Then, if they felt they could do the work, they would apply to him for the right to continue their control. All this arose from the specific recommendation of the Beaver Committee that certain industrial processes in which the prevention of dark smoke, grit or harmful gases presented special technical difficulties should be subject to the control of the Alkali Inspectorate. The Order would apply to only about 2,000 out of 30,000 works in the country.

As for power stations, there was no complete solution to the emission of dark smoke except by replacing the older power stations with new ones. If the peak load was to be met, they obviously could not afford to be without the older stations. This was a national, not a local, problem and they were more likely to find a solution if they continued their study nationally rather than locally.

The motion was, by leave, withdrawn. The Order will come into effect on 1st June.

Nigerian Railway Modernisation

Mr. Lennox-Boyd, Colonial Secretary, informed Mr. Hector Hughes that, with the object of speeding up train movements and reducing operating costs, the Nigerian Railway Corporation was undertaking a five-year programme of modernisation covering 1955-60, the estimated cost being £21,500,000. This included the provision of new diesel-electric locomotives, diesel railcar sets for suburban and branch line passenger services, new rolling stock, rebuilding stations and modernising the equipment.

Division Signalling System

New transmitters for the division bells in the House of Commons have been designed and fitted by the engineering branch of the London Telecommunications Region of the Post Office. The new equipment, and a new system of rings to denote a division and a "count" were introduced this week.

NEXT WEEK'S EVENTS

Organisers of electrical functions are advised to make use of the "Electrical Review" clearing house, Room 221, Dorset House, Stamford Street, London, S.E.1, to ascertain that proposed dates for their functions do not clash with others already arranged

Wednesday, 28th May

HOVE.—New Imperial Hotel, First Avenue, 7.30 p.m. A.S.E.E. Brighton, Hove and District Branch. Film night.

LONDON.—Savoy Place, W.C.2, 5.30 p.m. I.E.E. Supply Section. "Standardisation of Control Facilities for the British Grid Communications, Indications and Telemetering," by P. F. Gunning, and "The Development of Communication, Indication and Telemetering Equipment for the British Grid," by G. A. Burns, F. Fletcher, C. H. Chambers and P. F. Gunning.

RENFREW.—Combustion Engineering Association, Scottish Region. Visit to Babcock & Wilcox, Ltd.

Thursday, 29th May

LONDON.—Connaught Rooms, W.C.2, 12.30 for 12.55 p.m. Batti-Wallahs' Society. Luncheon. Guest speaker, W. Gibb (chief test pilot, Bristol Aeroplane Co.).

MAIDSTONE.—Royal Star Hotel, 7 p.m. A.S.E.E. Kent Branch. Annual general meeting.

Friday, 30th May

ABERDEEN. — Robert Gordon's Technical College, 7.30 p.m. I.E.E. Scottish Centre. Annual general meeting, followed by two films.

BIRMINGHAM. — Imperial Hotel, Temple Street, 7.30 p.m. Incorporated Plant Engineers, Birmingham Branch. Discussion on "Ideas and Problems."

Friday, 30th May, to Sunday, 1st June

PORTHCAWL. — I.E.E. Utilisation Section visit.

Saturday, 31st May

LEATHERHEAD.—I.E.E. Supply Section visit.

PRESCOT.—A.S.E.E. Bradford Branch. Visit to B.I.C.C.

Expanding Trade in Scientific Instruments

A STRONG plea to the Government to relax the embargoes which still continued, despite many representations, on the sale of a wide range of technical equipment to "Iron Curtain" countries, was made by Mr. Paul Goudime, president of the Scientific Instrument Manufacturers' Association, at the Association's annual luncheon at the Savoy Hotel, London, last week. "Where export licences are granted a substantial trade in British instruments exists and it is probably no exaggeration to say that this trade could be increased perhaps three times by the relaxation of the embargoes."

Although there might once have been sound strategic reasons, recent events must have made it all too clear that Soviet scientists were perfectly capable of copying the wide range of instruments which we were not allowed to export, but which they could freely see and discuss at many international exhibitions. The Association's export committee were now studying a proposal for the industry to stage a comprehensive exhibition in Pekin in 1960, but, Mr. Goudime asked, "are we justified in encouraging our members to invest a heavy capital sum in staging an exhibition some 8,000 miles away with little or no prospect of being able to sell much of the new and original equipment with which Britain can challenge the world?"

Mr. P. Goudime (president) with Mr. R. Maudling, the Paymaster General

The output of scientific and industrial measuring instruments in this country was about £70 million a year, of which rather more than 25 per cent was exported. An important factor was the high return for material consumed, and there were many examples of instruments which could be easily carried but which nevertheless brought back as many dollars as a motor car requiring perhaps half a ton of steel. To help users both at home and abroad to discover the sources of supply and particulars of the type of instrument best suited to their needs, the Association had established a technical inquiry service (Imperial 6000) which was linked with the Instrument Centre at 20, Queen Anne Street, London, W.1, where exhibitions covering various sections of the industry were held at regular intervals.

Avoiding Duplication of Effort

The Association had also set up a consultancy service, in co-operation with the Scientific Instrument Research Association, to remove one of the main causes of "unnecessary and sometimes tragic" duplication, namely the lack of information on what was being done in a particular sphere. The success of this scheme would, Mr. Goudime believed, mark a real step forward in conserving our scientific manpower. To avoid the tremendous duplication of effort between European countries, Mr. Goudime asked whether it was not possible that the Free Trade conception could "go beyond the progressive reduction in tariffs and quotas and aim at finding how the respective countries can collaborate at least on the scientific and technical plane." If this problem could be resolved it would result in a combined scientific effort in Europe which would surpass that of Russia.

Mr. Reginald Maudling, the Paymaster General and the Association's guest of honour, said that exports of instruments were not only valuable in themselves but were an important factor in the general prestige of British industry. Economic factors were fundamental to the East-West struggle and it would be a tragedy if we had to choose between Europe and the Commonwealth. The difficulties created for British firms by the Free Trade Area would be outweighed by the opportunities. By developing cross trade and each country specialising in the things it did best, efficiency and prosperity would be increased.

E.T.U. Presidential Address

IN his presidential address to the annual delegate conference of the Electrical Trades Union at Morecambe on Monday Mr. Frank Foulkes said that the Government must accept full responsibility for the breakdown in negotiating procedures that had been built up within the industry over the years. By their actions, by ministerial pronouncements and by intimidation they had affected the considered judgment of private employers and the employing authorities in nationalised industries. They had nullified any belief the organised workers might have had in negotiation as the best method of rectifying legitimate grievances and obtaining justifiable adjustments in wages and conditions.

How, Mr. Foulkes asked, could the workers in British Railways place any reliance upon the promise that long overdue leeway in living standards would be made good in the foreseeable future, when the position was completely reversed in relation to electricity supply? The supply industry had given more to the nation in increased production and productivity than the average for the whole of British industry, and the general level of profitability in the industry was higher than at any time since the industry was nationalised. To refuse an increase in wages to the workers in British Railways because of lower efficiency and productivity and excessive uneconomic services one week, and the following week cause a deferment of consideration of a claim in the electricity supply industry, where just the opposite factors existed, was indisputable truth of the intentions of the Government in relation to the workers' living standards. The community was under an obligation to guarantee the railway workers a living wage while they were improving efficiency, increasing production and creating additional capital values in British Railways. The electricity supply worker was equally entitled to a just reward whilst working in an efficient and productive industry and providing the community with a comparatively cheap commodity.

During recent negotiations, Mr. Foulkes said, it had

been shown that the widow of a labourer in the electricity supply industry with three children would be in a better financial position than when her husband was alive. After stoppages and expenses incurred in connection with his work, the labourer would receive £6 15s 5d a week, whereas his widow would receive £6 18s 6d on National Assistance.

The nationalised industries were, by deliberate intent, the milch-cows of private enterprise. Their function in a capitalist economy was to provide private industry with cheap services. The workers in nationalised industry, together with the workers in outside industry, were equally entitled to a fair share of the profits produced by industry as a whole.

In a reference to engineering firms, Mr. Foulkes said that profits for the first quarter of 1958 were £109·9 million, 22½ per cent higher than last year.

The first charge on industry should be the living standards and the health and welfare of the workers in industry. The 40-hour week had been the aim of the trade union movement for half a century and its realisation was long overdue.

Subjects of motions being debated during the week include an electrical contracting charter, which declares that the ultimate solution is nationalisation; apprentices; a sick pay scheme, and holidays with pay. Electricity supply motions deal with apprentices; working conditions; foremen's conditions; public holidays; long-service increments; and sub-contracting. One on subsistence allowance asks the Executive Council to treat as a matter of urgency the question of some monetary compensation for all manual workers who have to carry a meal every day.

A Clapham Branch resolution draws attention to "increasing apathy" of members towards union activities. It says small ballots and small branch attendances are placing the responsibility of election and planning of union policy in the hands of a small minority of union members. The branch suggests that a letter should be sent to all members pointing out that the vast majority are shirking their duties as trade unionists.

UGANDA BOARD'S FIRST TEN YEARS

IN the latest annual report of the Uganda Electricity Board the opportunity is taken to show what has been accomplished in the ten years since the Board's establishment. The centre of electrical interest is, of course, the Owen Falls hydro-electric station which last year was visited by more than 10,000 people. Another sign of the spread of electric power is the network of lines which now extend to most parts of the country; at the end of 1957 the aggregate mileage was 1,295. In 1948 public supplies of electricity were available only from a small wood-fired station at Gaba and a diesel station at Jinja, with a combined output of less than 7 million kWh. Last year 148·8 million kWh was generated, almost entirely at Owen Falls. During the year two more 15 MW sets were commissioned at the station, making six in all, and two more are expected to be completed this year.

A report received from the Economist Intelligence Unit in June confirmed the Board's view that the full capacity of the Owen Falls station (150 MW) would be required in about 1965 and the Board's consulting engineers were therefore instructed to prepare designs and specifications for a 180 MW hydro-electric station on the Nile at Bujagali, about 4½ miles downstream from Owen Falls. Detailed investigations have also continued into possible sites for small hydro-electric stations on the Muzuzi River and on the Nile at Karuma Falls.

Both circuits of the Owen Falls-Tororo 132 kV transmission lines are now operating at their normal voltage and, with the completion of the first 15,000 kVA transformer at Tororo substation, are supplying the whole area from Bugiri to Soroti. From the beginning of this year a bulk supply has been provided to Kenya over the combined U.E.B.-Kenya Power Co. 132 kV line between Owen Falls power station and Nairobi, one of the longest of its type in the world.

Good progress was made on the Busoga distribution scheme and Kamuli and Kaliro were connected to the Board's mains. Following the completion of a 33 kV line from Mbale, Soroti, which had its own diesel generating station, is now supplied from Owen Falls. Work started last year on a 33 kV line to supply Mbarara from the renovated Kikagati station on the Kagera River, and local distribution in Kikagati has been completed. The Board approved other comprehensive schemes to supply large areas of Central Mengo and the Mount Elgon/Pallisa area and consideration was given to schemes for supplying new areas in the Kibuga, near Kampala. The total capital expenditure approved on new schemes was £1,304,000.

Electricity sales rose from 82·3 million kWh in 1956 to 133·5 million kWh last year, an increase of 62·2 per cent. The Kilembe Mines copper smelter at Jinja accounted for 28·2 million kWh of this increase; for all other consumers the rate of expansion was 28·8 per cent. At 31st December consumers numbered 19,819 against 16,798 in 1956 and 3,263 in 1948.

The Board's training programme has been extended and now covers all departments. A full-time training officer has been appointed and took up his duties last month.

With regard to the Board's financial position, the report says that 1957 represented a turning point. The policy of charging to revenue account the interest on assets brought into commercial use during the year was continued and for the first time interest charged to revenue exceeded interest charged to capital. As a result of action by the United Kingdom Treasury, interest rates continued to rise. Capital charges dominated the expenditure, but stimulation of consumption, a buoyant revenue and the exercise of strict economies enabled the Board to finish the year with a small surplus of £6,793 and thus avoid any increase in tariffs, which have been the same for the last three years.

Actual and approved capital expenditure on fixed assets by the end of 1957 totalled £24·4 million. The net amount of loan interest during the year was £989,974, of which £543,635 was met from revenue and £446,339 was charged to capital. Income from sales of energy rose by 31·2 per cent to £1,102,066.

Lt.-Col. W. H. L. Gordon succeeded Mr. H. R. Fraser as deputy chairman of the Board in April, 1957. The chairman is Mr. W. D. D. Fenton, B.Sc., M.I.E.E.

Proposed New Cambridge College

A new college in which 70 per cent of the members would read scientific and technological subjects is proposed for Cambridge University. An appeal is being launched to raise about £3½ million, the cost of building and endowing the college. Trustees have been appointed to administer the funds and at the head of them is Sir Winston Churchill, after whom it is suggested the college shall be named.

I.E.S. SUMMER MEETING

REPORT OF DISCUSSIONS AT EASTBOURNE

OVER 300 delegates attended the biennial Summer Meeting of the Illuminating Engineering Society which began on 11th May with a display of lighting equipment at the Grand Hotel, Eastbourne. The president of the Society, Mr. E. B. Sawyer, who said that the exhibition formed a pleasing preface to the conference, introduced Dr. J. W. T. Walsh, president of the International Commission on Illumination, who opened the display. Dr. Walsh described some of the exhibits and congratulated the people responsible. One item of particular interest was a fluorescent tube transistor invertor. The two transistors generate a.c. at 1,000 c/s from a low voltage d.c. source and the unit is mainly intended for use in aircraft.

The conference was officially opened on Monday, 12th May, by the Mayor of Eastbourne, Alderman S. M. Caffyn, J.P., who recalled his first days on the Eastbourne Council 20 years ago. His first chairmanship had been of the former Electricity and Lighting Committee. He said that the Society would be 50 years old next year and during its existence lighting techniques had been completely transformed. No doubt the Society had helped in that trend. Mr. Sawyer thanked the Mayor and welcomed the overseas delegates.

Changes in Lighting Practice

A demonstration of shop window lighting was given during the presentation by Dr. H. H. Ballin of his paper on "Lighting Trends since 1945: A Survey of Industrial, Office and Shop Lighting." The window was first shown as it would have appeared in 1948. The lighting was then altered to illustrate shop lighting to-day and the effects of the various components of the overall lighting system were demonstrated, including the general, background, spotlighting and "picture frame" effects.

The discussion on this paper (a summary of which appeared in last week's *Electrical Review*) was opened by Mr. J. Reid, an architect. He said it was ten years since lighting started to develop after the war and now was a good time to take stock. There was no single solution of lighting problems; one had to use a combination of fluorescent and tungsten lamps. The examples of lighting installations shown by Dr. Ballin were a good average selection but the real design of lighting installations was only just beginning and the lighting equipment itself was far ahead of the user. Multiple stores were desperately lacking in architectural design. The work of the past ten years was only now being incorporated in new stores and this was mainly the architects' fault.

Mr. L. C. Rettig said that the minimum illumination levels for factories should be doubled from 6 to 12 lumens/sq ft and he observed that American owned factories in this country were showing the way. Mr. H. Olson said that with the new shapes of buildings, such as cantilevers and butterflies, the architect and lighting engineer were dependent on the structural engineer.

The integration of lighting into the building structure, said Mr. W. Imrie-Smith, was being carried too far, especially with regard to industry where lighting was required for utilitarian purposes. New lamps or new techniques were always misapplied at first. Some stores were now using supplementary lighting to obtain the required effects. In the future, integral lighting would be used for background effects and supplementary lighting for the main illumination.

Mr. S. Anderson noted that a table in the paper indicated that the light output from fluorescent tubes had increased fifteen-fold, for the same cost, since the early 1940s. He did not think there had been such a big increase and asked if Dr. Ballin could justify the figure. Dr. J. W. T. Walsh asked why the values of illumination levels recommended in the Code increased with each edition.

Mr. J. B. Harris asked if there was any simple method for the lighting of drawing offices using only fluorescent lamps. He thought the only solution acceptable to draughtsmen was the provision of individual lamps.

Fraternal greetings were conveyed to the conference from the I.E.S. Centre in Johannesburg by Mr. F. L. Cator. He asked the author why the two commonly used fluorescent tubes seen in South Africa were not mentioned. He was referring to the 8ft 75 W "slimline" and the 8ft 100 W very high output tube. Mr. A. Wilcock said that the reflector fluorescent tube was receiving considerable attention especially for industrial installations. He would appreciate some comments on this type of lamp.

In reply, Dr. Ballin said he thought that he had had a very easy passage in the discussion. Replying to Mr. Rettig, he said he was not in a position to forecast any changes in factory illumination requirements and agreed that many new factories were following American practice in this matter. Replying to Mr. Anderson's remarks, Dr. Ballin said the fifteen-fold increase in light output per penny was due to the improved economics of the tube and not to the lower cost of electricity. The increases in illumination levels referred to by Dr. Walsh were due to the fact that higher values were accepted and not to any desire to increase sales of lamps. With regard to the problem of the lighting of drawing offices raised by Mr. Harris, he said that one disadvantage of fluorescent tubes was the stroboscopic effect but he did not think that this was a real difficulty in such situations. With regard to Mr. Cator's question, Dr. Ballin said that the 8ft 125 W tube had a greater light output than the 8ft 75 W "slimline" and in this country we used the 5ft 80 W tube as a standard since it was more economical than the v.h.o. tube. The v.h.o. was, however, suitable for floodlighting. In reply to a question from Mr. A. Wilcock, he said that the reflector tube had distinct possibilities particularly in a dirt laden atmosphere.

Design of Glassware

Presenting the paper "Design and Production of Glassware for Lighting," Mr. D. Shellshear showed some typical examples of glassware and Mr. C. D. Cartwright demonstrated the technique of glass blowing. A short film of the glass blowing process was also shown.

Mr. B. Davies opened the discussion and asked whether the principles for the design of glassware for lighting stated by the authors were valid to-day. He asked whether the toning down of brilliance was not overdone. He thought there was room for development

in using clear cut glass to provide excitement in the form of the light produced.

Mr. D. Phillips thought that the paper was a whitewashing of the British glass industry to show that it was not lagging behind other countries. He asked what proportion of foreign glassware was used in this country compared with British manufactured glassware. The process of glassware production appeared to him to be somewhat medieval. Perhaps other countries were more mechanised. He thought that the decoration of fittings was being overdone; in some cases the shape of the glassware was distorted by over-decoration.

Mr. A. H. Nash asked why sandblasting was used when opal glass was available. The design of glassware was treated in a limited way in the paper, said Mr. A. Pott. Nothing was said about the function features such as directional requirements.

In reply, Mr. Shellshear said that Mr. Davies' comments were justified. The principle of the toning down of brilliance was really meant to refer to glare. He admitted the danger mentioned by Mr. Phillips of destroying the shape of glassware by over-decoration. The functional features mentioned by Mr. Pott were not a part of a paper of this nature. Mr. Cartwright said that a glass fitting with a lot of sparkle could be made but it would be costly. In reply to Mr. Nash, he said that sandblasting could be masked but dipping could not.

Use of Specular Reflectors

The discussion on Mr. E. Paivarinne's paper "Lighting in Finland" was opened by Mr. J. G. Christopher who said that lighting technique in Finland was influenced by the long hours of darkness. Among other points, he was interested in the wide use of mercury reflector lamps, the electronic dimming used in the new theatre and the illustration of ward lighting. He asked Mr. Paivarinne why 40 W fluorescent tubes were mainly used in Finland when 80 W tubes were also available. He noted the extensive use of specular reflectors and said that in this country we seemed to have forgotten their existence. The asymmetrical light distribution in classrooms mentioned in the paper was not suitable if the layout had to be changed. There appeared to be an extensive use of "Perspex" fittings in Finland. Mr. Christopher concluded by congratulating Mr. Paivarinne on his paper and his delivery in English.

Mr. E. Harrison-Jones was also interested in the extensive use of specular fittings in Finland and asked if it was not rather expensive for schools and whether the example was typical or a special application. Similarly, in office lighting, he thought that the use of aluminium specular fittings was rather costly. It appeared that 80 W tubes were used in Finland for industrial applications where we in this country would use 125 W tubes.

Mr. D. W. Durrant asked if the specular fittings were made of super-purity aluminium and were highly polished before anodising. Mr. A. G. Penny asked why reflectors were still used for street lighting in Finland when other countries used refractory fittings.

Mr. E. Paivarinne noted that there were no real disagreements with his paper, probably since the paper dealt only with lighting in Finland. The annual burning hours of lamps in schools in Finland were 400 to 1,000 and the relatively high cost of electricity demanded a high quality lighting installation. In spite of the high first cost of specular fittings, the running costs were lower. He agreed that the asymmetrical type of fitting could not be used in every case. The elimination of reflected glare was so important in schools that special fittings were justified. Fluorescent 40 W tubes were commonly used since they were the first type produced in Finland. Mr. Paivarinne understood that the first tubes produced in this country were rated at 80 W. With regard to street lighting, he thought that reflector fittings were used because of the lack of home produced refractory fittings.

Mr. A. H. Young, who opened the discussion of Mr. André Boereboom's paper "Lighting at the Brussels 1958 Exhibition," said he hoped that the example of the Brussels Exhibition would revive interest in the external lighting of public buildings in Great Britain.

Two examples of lighting practice particularly interested Mr. J. M. Waldram. They were the parabolic arch and the 1,500ft water ladder. He thought that the United States Pavilion had the best exterior lighting and the British Pavilion had the best interior lighting.

Dr. Ballin said he was intrigued by the clover leaf exterior fitting and asked why a tungsten lamp was used as well as fluorescent lamps. He thought that the lighting of the trees at the Exhibition was a little archaic. Fluorescent tubes did not seem to be used for tree lighting but the lighting of the fountains was excellent.

Mr. Cator did not agree with Dr. Ballin regarding the tree lighting which he thought was the best of all, particularly the trees in the park with their mass of small lights. He asked the author what kind of fitting was used in this case and the method of placing the lamps on the spheres of the Atomium. The lighting of the United States Pavilion was, he thought, good but the U.S.S.R. Pavilion lighting was garish.

Mr. S. Anderson asked if any difficulties had been

The president (Mr. E. B. Sawyer) and Mrs. Sawyer receiving, left, Mr. and Mrs. W. R. Stevens; centre, Mr. J. J. Chappat (France); and right, Mr. and Mrs. H. G. Campbell

experienced through the reactive loading of the large number of discharge lamps on the supply system.

In reply to Dr. Ballin, Mr. Boereboom said that the 1,000 W incandescent lamps incorporated in the clover leaf fitting were for emergency lighting supplied from an auxiliary diesel set. Mercury lamps took 5 to 6 minutes to restart after the restoration of the supply. He agreed that the lighting of the trees could be improved and they were still experimenting with these effects. The small lights in the trees were 10 W, 24 V. Special 10 W lamps were used on the Atomium. The extensive use of discharge lamps caused no difficulty since consumers were required to correct the power factor to at least 0·8. Mr. Boereboom concluded by thanking Mr. Cole, the secretary of the Society, for his help in the preparation of the paper and its translation.

Left to right: Mr. P. Massart (Belgium), Mr. E. Paivarinne (Helsinki), Mr. G. F. Cole (secretary of the Society), Mr. A. Boereboom (Belgium) and Mr. C. C. Smith (president-elect)

During the presentation of the paper "Lighting and Architecture" by Mr. G. Grenfell Baines and Mr. A. L. Hogg a demonstration of the effect of directional light on space and shape was given.

The discussion was opened by Mr. H. Hewitt. He said that the authors had shown him a new line of thought regarding non-illuminated ceilings; they were "suspended in space." This effect would be successful in entrance halls which were a connection with outer space. During the last few years the I.E.S. had encouraged a greater co-operation between architect and lighting engineer. The architect should specify the lighting effects he required but Mr. Hewitt believed that the lighting engineer could also use his imagination. He did not quite understand some of the architects' ideas or their jargon and the problem of communication was very real.

Mr. J. M. Waldram said he was particularly interested in the paper as an example of the co-operation of architect and engineer. He also referred to the basic difficulty of communication and the understanding of each other's nomenclature. It was only after the artistic matters had been settled that lighting calculations came into their own. He showed some slides taken at Gloucester Cathedral which demonstrated the effect of directional lighting to show form.

Mr. A. E. Gaster said that the balance of lighting design done by the engineer or the architect depended on the type of area to be lit; for example, there were little artistic requirements in a boiler house. Lighting engineers were not entirely Philistine and could quite often take part with the architect in making suggestions.

Mr. D. Phillips thought there were occasions when artificial light could be made to produce the directional daylight effect. He asked if the authors felt that this was always wrong.

Mr. F. Widnall observed that many rooms had more than one function but integration of lighting with the structure tended to fix the positions of electrical services and points. A point made by Mr. H. E. Bellchambers was that a third person who was vitally interested in the design was the client, particularly with regard to the economics. He also thought that flexibility of the lighting system was not always desirable since a change might destroy the balance of shapes and spaces. Mr. L. C. Rettig pleaded for monotony in some areas of a lighting scheme.

In reply, Mr. Hogg said that the clients' lighting requirements must be initially specific as this might determine the building design. Mr. Baines agreed with Mr. Hewitt that jargon must be pruned to make communication easier. He had no wish to define the boundary between the work of the architect and the engineer and he felt it was wrong for them to become experts only in their own particular sphere. Referring to the plea for monotony, he said that Mr. Rettig was really asking for variety, the answer being a proper balance of the lighting schemes, but he was not convinced that complete evenness was justified.

A demonstration showing the effect of good and bad lighting in an hotel room was given when the paper "Character and Compromise in Hotel Lighting" was presented by Mr. C. Dykes Brown and Mr. W. R. Stevens. Opening the discussion, Mr. F. Massey said that only three new hotels had been built in Britain since the war so it was not surprising that the many new Continental hotels had lighting schemes which were more imaginative than those in this country. He thought there was a need for a neat domestic fluorescent fitting for use in hotels. Lifts should be treated as rooms for lighting design and not as coffins, and enough light was required in corridors for guests to find the room number and the keyhole. He thought that the paper would rate as a work of reference on hotel lighting.

Mr. H. Carpenter suggested that dining room table lamps should be made with batteries in a heavy case to avoid trailing flex and the possibility of their being knocked over.

Mr. A. G. Penny said that maintenance schedules were suitable in factories but were not applicable to hotels where there was such a divergence of burning hours. In hotels, tungsten lamps had an advantage over fluorescent tubes since it was obvious when they failed.

After the discussion on the last paper the president in a closing speech thanked all those who had taken part in the conference.

Social Functions

During the conference, on Monday evening, a reception was held by the Mayor of Eastbourne and, on Wednesday evening, the annual dinner of the Society and the president's reception took place in the Grand Hotel.

At the annual dinner the toast of the Illuminating Engineering Society was proposed by Dr. J. N. Aldington. He said that greater productivity was linked with proper lighting on the working plane. Road safety was not only a problem for the road engineer but also the lighting engineer. The work of the I.E.S. permeated every aspect of modern society. After 50 years of existence the Society had reached a period of transition. They should now look to the next phase and a move should be made to make

membership a professional qualification. In replying to the toast, the president said they were very fortunate to have Dr. Aldington as the principal guest. He was very pleased that so many ladies had attended the conference; he believed that the Society should have more lady members since they had a distinct aptitude for artistic design. He hoped that the technical sessions at the conference would help to ensure that lighting standards would be improved.

Dr. W. E. Harper proposed the toast of the guests. He particularly mentioned Dr. Aldington, Dr. Walsh, the overseas delegates and the Mayor. After the response by the Mayor the president handed the Dow Cup to Mr. A. D. S. Atkinson who had won the golf competition.

NEW CATHODE-RAY TUBE

IN the discussion on the paper "A New Cathode-Ray Tube for Monochrome and Colour Television" read before the Institution of Electrical Engineers on 14th May and reported in our last issue, Dr. J. D. Stephenson (Mullard) said that the authors had made an important contribution to knowledge of a highly specialised branch of science. They had also shown great inventiveness, not only in the original conception of their cathode-ray tube, but also in overcoming the difficulties and solving the difficult technological problems associated with manufacture.

It was, he thought, a tube not of the immediate future but of a long time hence. In a device intended for mass production manufacturing costs were of over-riding importance, and the complicated nature of the tube could make it far too expensive to satisfy even the most enthusiastic person. In the case of colour presentation, he personally was doubtful whether the proposed simplification of shadow mask and screen compensated for the intricate electron-optical system required.

Revolutionary Invention

Mr. G. G. Gouriet (B.B.C.) said the paper was a departure from convention in almost every direction one could think of. Indeed, it bore the mark of many other revolutionary inventions of the past which though they might not have filled a need at the time, had blazed a trail for future development. The authors' tube was as different from the conventional as was the turbo-jet engine from the petrol engine, and no doubt the difficulties were of similar magnitude. There was no need to justify it in terms of the coming of colour television. Indeed, the one thing wrong with colour television at the moment was the cost of the tube and its ancillaries.

Mr. M. E. Haine (Siemens Edison Swan) said the authors had shown remarkable perseverance and ingenuity in solving the difficult three-dimensional electron-optical problems. This had not involved just first-order trajectory plotting, but the determination and compensation of some higher order aberrations. He hoped the authors would write up their work in this direction, as it would be most useful to other laboratories and to industry.

Mr. T. Kilvington (Post Office) said the authors seemed to be able to manipulate their problems in such a way that the snags were turned into positive advantages. He was disappointed that the tube would be expensive. This was puzzling because the various pieces were not difficult to make and should be amenable to manufacture. He had thought the tolerances might be responsible, but Dr. Gabor had assured them that this was not so.

Mr. P. S. Carnt said that the fact of having only one modulating electrode per gun limited the number of circuits which could be used in the colour receiver. With two it was possible to feed the high definition illumination signal on to one electrode and the narrow band low definition colour difference signals on to the other.

Mr. C. L. Hirshman said that the proposal for five cathodes in the construction allowed two of them to have a higher current density but still restricted the time available during which they could be used. It might be better to provide three separate guns, one for providing the information, one the lens discharge, and one the array discharge.

Scottish Electrical Training Scheme

THE first annual meeting of the Scottish Electrical Training Scheme, Ltd., was held in Glasgow on 7th May. After briefly recapitulating the events leading up to its establishment, Mr. K. W. Atchley (chairman), in his report, said that during the year seven graduates, thirty-nine undergraduates (vacation) and fifteen pre-college students, a total of sixty-one, were enrolled in the scheme and received training in members' establishments. Of these, two graduates, nine undergraduates and two pre-college students withdrew or were for various reasons discharged. Intake of new trainees so far in 1958 had been satisfactory. The progress achieved was impressive. Apart from the fact that the numbers of trainees engaged had come well up to expectations, the scheme had atracted wide interest. The first conference of all trainees and members, held at Alloa and Kincardine on 20th September last, fulfilled a useful purpose in bringing everyone together for exchange of views and discussions. The many short introductory courses for school-leavers held at members' establishments in widely separated centres in Scotland would seem in the main to be achieving their desired purpose of spreading knowledge of the excellent future the electrical engineering industry of Scotland had to offer the young man as a career. The rapid development of the scheme had brought its problems. Although the variety of training available was great this very fact required that members, each in contact with a trainee for a relatively short time, took special care to ensure his full acceptance into their organisations and gave him opportunities for meeting senior staff to discuss matters concerning which help and guidance was not available at workshop level. Related to this was the desirability of providing during workshop training means of stimulating the student's technical interest.

ATOMIC SAFETY COMMITTEE

SIR DOUGLAS VEALE, C.B.E., until recently Registrar at Oxford University, has accepted the chairmanship of a committee set up by the United Kingdom Atomic Energy Authority to advise on training in radiological protection. The committee includes Sir Ernest Rock Carling, consultant adviser to the Ministry of Health, Atomic Energy Authority and the Home Office, Professor W. V. Mayneord, director of the Physics Department, Institute of Cancer Research, Royal Marsden Hospital, and Professor B. W. Windeyer, Professor of Radiology (Therapeutic), University of London.

The committee will advise the Authority on the training and provision of specialist health and safety staff, not only for the Authority's own purposes but also to meet the needs of the nation as a whole.

INDUSTRIAL NEWS

British Reactor for Germany?

Last week the West German minister responsible for atomic energy, Dr. Siegfried Balke, was in London for discussions on nuclear reactors. *The Times* reports that he said it was probable that Germany would buy a British reactor because it was the first type to be operated. Sir Edwin Plowden, chairman of the United Kingdom Atomic Energy Authority, held a dinner party on 14th May at which Dr. Balke was the guest of honour. Among those present were the German Ambassador, Sir John Cockcroft and Mr. Leslie Gamage.

Engineering Companies Merge

Metal Industries, Ltd., announces that on 31st May two of its wholly owned engineering subsidiaries, Fawcett Preston & Co., Ltd., Bromborough, Ches., and Finney Presses, Ltd., Birmingham, are to be merged. The combined company will be known as Fawcett Preston & Co., Ltd. (incorporating Finney Presses). Manufacture is to be concentrated at Bromborough and the Birmingham works will eventually be closed. The joint selling organisation of the two companies, Fawcett-Finney, Ltd., is to cease operations and in future sales will be handled by Fawcett Preston & Co., Ltd.

Designs in Plastics

With a view to encouraging young designers in plastics, the Worshipful Company of Horners has been awarding prizes for the best designs entered in an annual competition organised by the British Plastics Federation. In previous years the award, of up to 50 guineas, was sometimes divided between several entries, but this year it has been decided to have only one prize, which will be presented to the winner at a dinner of the Worshipful Company of Horners to be held in a City livery company's hall in London. The competition is open to anyone resident in Great Britain and Northern Ireland, not over 30 years of age on 30th September, 1958, and leaflets giving details of the regulations have been issued to art schools and colleges all over the country.

Caravans for the Tropics

Three mobile units, made by Coventry Steel Caravans, Ltd., Newport Pagnell, are to be sent to Nigeria where they will provide homes for Siemens Edison Swan engineers working on Government cable-laying schemes for telephone networks. Each of the caravans, known as the "NuLine," has a 35 gal galvanised header water tank beneath which is fitted a vitreous enamel bath and a stainless steel sink unit. At one end of the bath is a cabinet containing a 15 gal thermostat-controlled electric water heater. There are six 13 A ring main electric power points at floor level, the electric circuit being protected by a double-pole earth leakage trip switch, main switch, copper earth rods, etc.

Epicyclic Gears for Canada

W. H. Allen, Sons & Co., Ltd., have received an order from the General Electric Co., Ltd., for epicyclic gear units as part of the G.E.C. motor-driven centrifugal compressor plant for installation at the National Aeronautical Establishment, Ottawa, for the Canadian Department of National Defence. Two speed-increasing gears are included, one of 11,000 h.p. and the other of 3,600 h.p. capacity. The gears will be mounted in the pedestals supporting the motor/compressor bearings and will increase the motor speed of 1,200 r.p.m. up to a final compressor speed of 10,000 r.p.m.

Iron and Steel Import Duties

Under the Import Duties (Exemptions) (No. 10), (No. 12) and (No. 16) Orders, 1957, the import duties on a wide range of iron and steel products are suspended until 18th September next. After consultation with the Iron and Steel Board the Government has decided to prolong until 31st December next the suspension of import duty on (a) most types of cold-reduced sheets of a value of less than £90 per ton and (b) hot-rolled strip over 18in wide in coils weighing more than 3 cwt. A new Order, the Import Duties (Exemptions) (No. 8) Order, 1958 (S.I. No. 797), has been made and will come into operation on 19th September. The question of further suspension of duty on other iron and steel products after 18th September is being examined.

Improved Telephone Instrument

The Assistant Postmaster General, Mr. K. Thompson, announced in the House of Commons last week that the Post Office had completed the design of a new telephone instrument with an improved technical performance and in a new and extended range of colours. First supplies were expected in the spring of next year.

M.P.s who went to see an exhibition of old and new telephone instruments at the House of Commons were told that the new telephone had been made possible by research into new and improved components which had been undertaken in recent years by the Post Office in co-operation with the leading British telecommunications manufacturers. The use of these components and of modern manufacturing methods meant that the new telephone would work over lines of 50 per cent greater electrical resistance, so allowing thinner and cheaper wires to be used in street cables. Because more wires would go into the same cable duct, considerable overall economies would result. In some of the telephones the internal components would be mounted on a baseplate with interconnection by means of printed circuits. The handset of the new telephone would be lighter and more comfortable to use, and the letters and figures would be shown on an enlarged dial.

Frost Prevention at Everton Football Ground

Engineers of the Merseyside and North Wales Electricity Board are laying 32 miles of p.v.c. "Calidec" cable to provide a heating system under the turf of the Everton football ground. This is claimed to be the first installation in the country involving the use of floor warming technique as ground frost prevention. There are 225 pairs of wires running the full length of the pitch. They are being laid above the clinker foundation, embedded in the soil, then covered with a 6in layer of top soil. Each pair of cables will have its own separate fuses. The total loading of 750 kW can be reduced in steps of one-third or two-thirds to deal with weather variations.

The maximum cost of running the

Mr. D. H. Kendon, chairman of the Merseyside and North Wales Electricity Board, discussing the Everton football ground heating installation with Mr. B. Askham, chairman of the Ground and Maintenance Committee

installation will be about £3 per hour. The whole job, including the complete re-laying and re-seeding of the pitch, will cost the Everton Football Club something like £13,000, of which the cost of the turf warming installation is about £7,000.

Aircraft Catering Equipment

The General Electric Co., Ltd., has received an order from Scandinavian Airlines System for the supply of 100 specially-designed air circulation catering ovens. The order is valued at £25,000. The ovens are for installation in the DC7, DC8 long-range jet, and "Caravelle" medium-range jet airliners which S.A.S. has on order.

Another order for aircraft catering equipment received by the G.E.C. recently is from B.O.A.C., for the galleys of its new Comet 4 fleet. This order, worth £13,500, is for the supply of 43 air circulation ovens, 114 beverage containers, and 48 hotcup units. British European Airways has also specified G.E.C. catering equipment for its fleet of Vickers Vanguard turbo-prop airliners, due to go into service in 1960.

H.V. Cable for Snowy Mountains Scheme

Six 13½-ton drums, each holding 550 yd of 330 kV oil-filled cable—the highest working-voltage cable so far made—were loaded in London recently for the Snowy Mountains (New South Wales) Hydro-Electric Scheme. The cable, manufactured by Pirelli-General Cable Works, Ltd., was shipped aboard s.s. *Townsville Star* at the King George V Docks. The company is making all the power cable for the project.

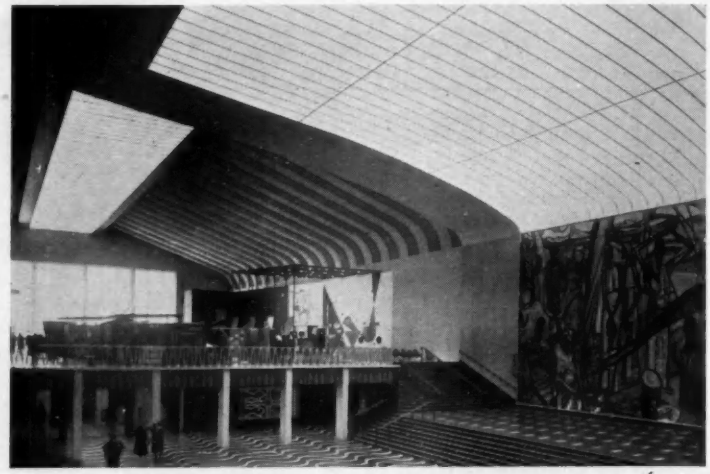
E.D.A. at Chelsea Flower Show

The main emphasis of the British Electrical Development Association's stand at the Chelsea Flower Show which has been in progress this week is on amateur greenhouse heating. Other exhibits include a heated propagating frame, a rotary tiller chain saw, lawn verge cutter, hedge trimmer, long grass cutter and a soil steriliser.

Power Station Cable Contracts

Drake & Gorham (Contractors), Ltd., northern office at Manchester has been awarded two large cabling contracts by the C.E.G.B., for High Marnham and Agecroft "B" power stations, valued at approximately £750,000. At High Marnham the contract covers h.v. and l.v. main and auxiliary power cables, control and instrument cables for the five 1,400,000 lb/hr boiler and 200 MW turbo-alternator units, together with cables for all station services and ancillaries. The company has already been engaged on the site since work started there in 1956, and is responsible for the distribution network for all construction supplies, permanent road lighting, and for the provision and maintenance of power and lighting services to the many engineering contractors engaged on the project. A further contract has also been received by the company for the first phase of the lighting and heating installations for the station.

At Agecroft "B" station the contract covers the e.h.v., h.v. and l.v. main and auxiliary power cables, together with control and instrument cables, for the two 120 MW turbo-alternators, associated boiler units, station services and ancillaries.



The large lumenated ceiling in the Belgian Congo Pavilion, Brussels

Industrial Films and Technical Education

A conference on the industrial film in technical education organised by the Midland Industrial Film Association was held on 8th May at the G.K.N. Group Research Laboratory at Wolverhampton. The conference was called with the object of clarifying the needs of the technical teacher. It was attended by principals or their representatives from nine technical colleges in the Midlands area, with representatives from Birmingham University and the Midland Industrial Film Association, and invited speakers. It was under the chairmanship of Dr. T. Emmerson, director of research, G.K.N. Group Research Laboratory.

Large Lumenated Ceiling at Brussels

In the notes on the Brussels Universal and International Exhibition in our issue of 18th April we made reference to the expansive "lumenated" ceiling in the Belgian Congo Pavilion. We now reproduce a view of the interior of the building in which the ceiling is prominent. It has an area of 25,000 sq ft and is claimed by the company responsible, Lumenated Ceilings, Ltd., to be the largest luminous ceiling in Europe. The company also supplied a further 25,000 sq ft of ceilings for other sections of the Exhibition.

House Journal Wins National Award

The house journal of the South Western Electricity Board, *South Western Electricity*, has won an award in the National House Journal Competition as one of the best magazines of its kind of the year. The editor is Mr. G. Denbury.

Electrical Housecraft Conference

A conference on the teaching of electrical housecraft has been arranged by the Electrical Association for Women on 7th June at St. Wulfram's School, Harrowby Lane, Grantham, Lincs. A fee of 5s will be charged to include the cost of meals. The conference is open to teachers of science and domestic science.

Ekco Acquisition

E. K. Cole, Ltd., has acquired the Warm-Glow Co., Ltd., electric blanket manufacturers, of Leigh-on-Sea, Essex. Production will continue at the present Warm-Glow factory and the company's managing director, Mr. F. Grisley, will remain on the board.

Crane Distributors' Conference

Delegates from over 40 countries attended a conference of appointed distributors of Coles cranes, which was held by the manufacturers, Steels Engineering Products, Ltd., at the Royal Hotel, Scarborough, from 27th April to 4th May. One of the aims of the conference was the formulation of a sales policy for the marketing of a new range of self-propelled, truck-mounted and shunting-loco cranes. The largest of these, Model L.5012 "Conqueror," can lift 45 tons at 10ft radius with a 50ft centres strut jib of lattice construction. Extension pieces can be added to increase the length to

14oft, and a fly jib extension gives a further 30ft. The crane is mounted on an eight-wheeled truck, and the hoist, derrick and slew motion motors are supplied from a variable-voltage diesel-electric generator. It can be operated by one man and has unlimited full-circle slewing in either direction. An automatic safe load indicator gives an audible and visible warning, and if the supply of current is interrupted electro-mechanical brakes are automatically applied to the crane motions.

Works Visit

Nearly ninety members of the Birmingham Electric Club, including the president, Mr. J. Clement (managing director, A.E.I. Lamp & Lighting Co., Ltd.), and other officers, visited the Willesden works of the British Thomson-Houston Co., Ltd., on 14th May. The visitors were welcomed by Mr. P. E. Gaze, manager, switchgear contracts, and listened to a short illustrated talk by Mr. C. F. Humphreys, manager, Switchgear Engineering Department, on recent B.T.H. switchgear developments, which included details of the company's 330 kV switchgear for the Kariba hydro-electric scheme in Southern Rhodesia. After lunch at the Oldfield Hotel, Greenford Green, Mr. E. Alexander, Willesden works manager, spoke, and he was thanked on behalf of the members by Ald. W. S. Lewis, president-elect of the Club and chairman of the Midlands Electricity Board.

Returning to the works, the members and guides formed into small groups for comprehensive tours.

Ceiling Lighting Exhibition

In conjunction with Reynolds of Southsea and Atlas Lighting, Ltd., an exhibition of the Atlas "Sylvalume" ceiling was held by Harbottle-Leeson, Ltd., electrical wholesalers, Portsmouth, in Reynolds' showroom where a small area had been installed for a permanent display. The exhibition was well attended by representatives of local architects and leading business houses in the town.

Automation and Spot Welding Exhibition

Bates & Bates, Ltd., are holding a demonstration of standard and special purpose multiple spot welders in their works at Blackburn Street, Garston, Liverpool, 19, from 8th to 11th July. Admission is by invitation only.

Annual Holidays

Lindsay & Williams, Ltd., Openshaw Bridge Works, Manchester, 11, announce that their works and offices will be closed for annual holidays from 26th July to 4th August inclusive.

Change of Address

The Scottish office of the Factory Department, Ministry of Labour and National Service, has moved to Montrose House, 187, George Street, Glasgow, C.1 (telephone: Bell 4455).

Trade Announcements

British MonoRail, Ltd., has moved to a new factory in Wakefield Road, Brighouse, Yorks. (telephone: Brighouse 2244).

Nettle Accessories, Ltd., has acquired additional premises for its sales division at Warren Street, Stockport (telephone: Stockport 2471). From 2nd June all correspondence relating to sales, orders, dispatches, and relevant matters should be forwarded to this address.

Racal Engineering, Ltd., Bracknell, announce that they are now acting as exclusive agents in the United Kingdom for the sale of "Transitron" equipment manufactured by Van Norman Industries, Inc., of Manchester, New Hampshire, U.S.A.

The **Yorkshire Factoring Co., Ltd.,** announces that its Nottingham subsidiary, **G. H. Boot & Co., Ltd.,** has moved to new premises at 149, Forest Road West, Nottingham (telephone: Nottingham 71796).

The **London Electric Wire Co. & Smiths, Ltd.,** and its associate companies, **Frederick Smith & Co.,** the **Liverpool Electric Cable Co., Ltd.,** and the **Vactite Wire Co., Ltd.,** are moving their Glasgow branch on Monday next to Lewcos House, 66-74, Brown Street, Glasgow, C.2. The telephone number remains Central 9002/3/4.

E.A.W. Gravesend Celebrations

This year the Gravesend Branch of the Electrical Association for Women reached its silver jubilee and last week the occasion was duly celebrated. An excellent four-day exhibition (with frequent demonstrations) was arranged at the Town Hall by the Gravesend District of the South Eastern Electricity Board with the co-operation of a dozen leading appliance manufacturers. Miss Mary George, director of the Association, who was introduced by the Mayor of Gravesend (Councillor R. H. Goodwin), opened the exhibition. In the course of a brief address Miss George stressed the necessity for women to learn something about the appliances they employed so that they could make a wise choice and use the equipment to the best advantage. She referred to the Association's "Electricity for Everywoman" campaign and its efforts to secure more adequate installations.

Mr. G. V. Harrap, the District manager, thanked Miss George and praised the work of the E.A.W. to which, he said, the electricity supply industry was greatly indebted. He made special reference to the presence of Sir John Hacking and Mr. Peter Kirk, M.P. for Gravesend.

Mrs. A. A. Holland, chairman of the Gravesend Branch, expressed the Association's thanks to the Mayor, Mr. Harrap and Mr. A. R. Richardson, the district commercial officer. Mrs. G. A. Tatchell, J.P., president of the Branch, also spoke.

Mrs. Tatchell presided at a subsequent luncheon at the Central Hotel when the other speakers were Mrs. C. U. Cole, chairman of the E.A.W. Woolwich Branch, the Mayor of Gravesend, Sir John Hacking, Mrs. Holland and Mr. H. F. Knell, Kent manager of the S.E. Electricity Board. Mrs. Cole made a brief, erudite survey of Gravesend's history and Sir John Hacking reviewed the contributions that had been made by British scientists and engineers to the foundation and advancement of the electrical industry.

Mr. Knell spoke appreciatively of the Association's work, crediting the Gravesend Branch with a substantial contribution to the domestic electrical progress made in the district.

There followed an afternoon meeting and tea party at which Miss George gave an address, and a birthday cake was cut. A number of local schoolgirls were invited to this function and to the exhibition.

Miss Mary George opening the exhibition. On her right are Mrs. A. A. Holland and the Mayoress; on her left the Mayor, Mrs. G. A. Tatchell and Mr. G. V. Harrap

GENERATION AND DEVELOPMENT

Output in April

The monthly statement of the Ministry of Power shows that 7,960 million kWh was generated in April by the Central Electricity Generating Board, the North of Scotland Hydro-Electric Board and the South of Scotland Electricity Board, an increase of 11·8 per cent compared with April, 1957 (see table). At 30th April last the total installed capacity was 26,812 MW, representing an addition during the month of 112 MW.

ELECTRICITY GENERATED AND SENT OUT FOR PUBLIC SUPPLY

	Fuel consumed Thousand tons			kWh generated Millions			kWh sent out Millions	Installed capacity (m.c.r.) MW
	Coal	Coke and Breeze	Oil	Steam	Water power	Total		
Central Electricity G.B.	3,527	77	145·3	7,317	5	7,330	6,881	24,435
North of Scotland H.E.B. ...	12	—	1·4	18	114	137	136	912
South of Scotland E.B.	254	7	0·1	484	9	493	467	1,465
Total for April, 1958	3,793	84	146·8	7,819	128	7,960*	7,484	26,812
Corres. total for April, 1957 ...	3,568	69	32·6	6,972	135	7,117	6,687	24,779
Inc. or dec., per cent	+6·3	+21·7	+350	+12·1	−5·4	+11·8	+11·9	+8·2
Total to date (4 months), 1958 ...	17,496	368	528·1	35,321	826	36,211	34,105	
Total for corres. 4 months of 1957	16,038	324	71·6	30,878	901	31,825	29,945	
Inc. or dec., per cent	+9·1	+13·7	+637·7	+14·4	−8·3	+13·8	+13·9	

* The total figure includes generation by other methods amounting to 13 million kWh.

In the four weeks ended 26th April 813·6 million kWh was generated by industry, an increase of 4·2 per cent; this figure includes 46 million kWh produced at the Calder Hall nuclear power station.

Mobile Generators Maintain Supply

Four of the South Western Electricity Board's mobile generators were brought into service at Stoke St. Gregory and North Curry, Somerset, on 8th May to help to maintain continuity of supply while essential engineering work was being carried out on high-voltage mains. The mains supply was shut down for nearly twelve hours but well over half the 300 to 400 consumers affected were connected up to the mobile generating sets.

Views on Joint Services

Ways in which the electricity and gas industries might co-operate were considered recently by the General Purposes Committee of the Eastern Electricity Consultative Council which has been requested to submit evidence to the Ministry of Power Committee examining the subject. Reporting to the full meeting of the Council on 9th May, the chairman (Alderman W. J. Bennett) said that on joint meter reading the General Purposes Committee agreed that, as consumers, they would be in favour if it could be shown to achieve economies. The Committee favoured the maintenance of vigorous and effective competition and felt that joint service centres and showrooms were impracticable. On co-operation in public utility street works, they had no observations to make. Local authority engineers and surveyors who had been consulted said that except in isolated cases no difficulties had been experienced.

New Bradford Grid Supply Point

The Staygate grid supply point at Rooley Lane, Bradford, which will help to meet the increased demand for electricity by industrial, commercial and domestic consumers in the Bradford area, was officially opened by the Lord Mayor of Bradford (Ald. Dr. David Black) on 8th May. Mr. D. Bellamy, chairman of the Yorkshire Electricity Board, said that the supply point itself had cost £280,000, while the total cost, including the substations to step down the supply for Bradford consumers, was £800,000. At a subsequent luncheon at the Victoria Hotel, Mr. Bellamy presented the Lord Mayor with an electric warming plate.

Re-lighting of Putney Bridge

The lighting of Putney Bridge has been converted from gas to electricity, using the existing lanterns which were installed when the bridge was opened in 1886. These are of sheet copper and of first-class workmanship and design. With the 250 W colour-corrected mercury lamp now fitted the increase in light output was expected to be at least three times, and subsequent tests more than substantiated this. The spread of light over the carriageway could not be expected to be as even as with a more conventional type of lantern mounted at 25ft, but in this case it was felt that to scrap the existing lanterns would alter the character of the bridge.

The work of planning the installation and details of converting the lanterns for electric light were carried out under the directions of the chief engineer, London County Council (Mr. J. Rawlinson), and Mr. C. A. Belcher, divisional engineer (electrical), assisted by Mr. H. Hazel. The wiring was carried out in Pyrotenax cable throughout and Venner time switches with spring reserve were used to group control the lights. The contractors for the electrical installation were the D.C. Engineering Co., Ltd., the Escaré Art Metal Co., Ltd., being responsible for the renovation and conversion of the lanterns.

Tyne Crossing

The Tyne Improvement Commission has again adjourned consideration of an application by the Central Electricity Generating Board to construct a 275 kV line across the Tyne between Jarrow and Howdon. The Commission is to be represented at a conference of local authorities in the area when the matter is to be discussed. At a meeting of the Commission reference was made to the dangerous situation which might arise if the proposed transmission line broke, but the chairman (Mr. A. G. Everett) said that the Generating Board had given an assurance that in such an event the line would become "dead." Mr. A. E. Gompertz said the Generating Board was bound to say there was no possibility of danger, but he contended that an impartial opinion should be obtained.

OVERSEAS

Kariba Construction Speeded Up

The Salisbury (Southern Rhodesia) correspondent of *The Times* reports that the whole Kariba Dam programme has been accelerated in view of this year's record floods which caused three months' delay. According to a statement by a spokesman for Impresit, the Italian contractors, last month 50,000 cu yd of concrete was poured into the main dam wall and this month it is hoped to raise the total to 70,000 cu yd. By keeping up this pace it is hoped to complete the dam in July or August next year, six months ahead of schedule.

Nigerian Water Power Project

It is planned to construct a large dam and a 10,000 kW hydro-electric station at the Tiga rapids on the Kogin Kano River in Northern Nigeria. Investigations have indicated an average daily discharge throughout the year of 1,000 million gallons, but the daily discharge during the wet season would be considerably in excess of this amount, tailing off to negligible proportions at the end of

the dry season. To supply the station a large artificial lake would be created upwards of six miles long and more than a mile in width. A pilot dam has been constructed on the site to check the effects of siltation. Dr. T. P. O'Sullivan, principal of the engineering consultants concerned, estimates that the cost of the dam, with a vehicular road across it, power house and pipeline, would be £3 million.

Canadian Water-Power Resources

Present recorded water-power resources of Canada are shown in the annual review of the Water Resources Branch, Department of Northern Affairs and National Resources, as totalling more than 46 million h.p. under conditions of low steam flow and over 66 million h.p. at average flow, the latter figure representing a feasible turbine installation of more than 87 million h.p. The total turbine installation at the end of 1957 was 19,891,008 h.p., indicating that less than 25 per cent of available resources has been developed. The installed capacity of water-power plants now equals 1,199 h.p. per thousand of the population.

During 1957 hydro-electric construction continued to accelerate and new capacity to the extent of 1,546,560 h.p. was brought into operation, good progress being made on other new developments.

Copies of this review may be obtained free of charge from the Director, Water Resources Branch, Department of Northern Affairs and National Resources, Ottawa.

N.S.W. Power Programme

The New South Wales Electricity Commission states that to meet the increasing demand for electricity it will have to bring into operation by 1964 one million kW of thermal and hydro-electric generating plant. A spokesman for the Commission said that £190 million would be needed in the next seven years for generating plant, transmission works, and expenditure on power stations for future service.

Cooling Pond Experiments

Preliminary results of the first large-scale radioactive isotope tracer tests conducted in Australia are now being examined by the New South Wales Electricity Commission. The work is part of a series of experiments being carried out in the Hunter River Valley with a view to the establishment of a large new power station. The investigations may lead to the creation of an inland lake to solve the problem of providing sufficient water for an inland station on the northern coalfields.

Meteorological and stream gauging stations have been established at a number of sites within the Hunter Valley, and records of air temperatures, humidity, wind velocity, evaporation and solar radiation are being collected to assist in the design of suitable cooling ponds. In addition, records of water temperatures are being regularly obtained and detailed tests are being carried out in a disused reservoir adjacent to Maitland power station to trace the flow of warm water discharged from the condensers. Fluorescing dyes have been used in these tests for some time and, more recently, radioactive iodine isotopes have been employed to gain information on the depth and extent of the mixing of the water. The latter work is being carried out by the Atomic Energy Commission.

E.D.A. Public Speaking Competition

FOR the first time the London Electricity Board has been successful in winning one of the major awards in the E.D.A. Public Speaking Competition, the finals of which were held in London on 14th May.

Mr. R. A. Ashton, a senior assistant in the commercial service office, Brixton, won the Faraday Silver Challenge Shield (men's section) with an address on "How Advertising Helps the Consumer." Second place went to Mr. R. H. Jones, who is at the headquarters of the North Western Electricity Board, Manchester, and who spoke on "Progress and Rural Amenities," and third position was gained by Mr. P. G. Cope, second assistant engineer, Wakefield Sub-Area, Yorkshire Electricity Board, whose address was on "How Advertising Helps the Consumer."

The South of Scotland Electricity Board gained the women's shield—the second time it has done so. Mrs. Andrena McFarlane, a demonstrator in the Clydebank district, was their champion with an address on "The Demonstrator." Miss Audrey Anderson, an assistant in the Bude service centre, South Western Electricity Board, was the runner-up, her subject being "Let There be Light," and Mrs. Marian Nicholls, a demonstrator with the North Western Board at Burnley, who spoke on "Progress and Rural Amenities," was placed third.

The judging was shared between Miss Ester Purvis, Mrs. M. Fitzhugh, Mr. E. A. Mills, Mr. F. Hoare, Mr. A. Timothy and Mr. F. Phillips. Mr. J. I. Bernard, director and secretary of E.D.A., acted as chairman of the contests and presented the winners with their awards.

Winners of the E.D.A. Public Speaking Competition for men seen with the Faraday Silver Challenge Shield. Mr. R. A. Ashton (the winner) is on the left shaking hands with Mr. R. Jones, runner-up. Mr. P. G. Cope, who was placed third, is in the background. Right: Winners of the women's competition with the Faraday Silver Challenge Shield — Mrs. Andrena McFarlane (first), Miss Audrey Anderson (runner-up) and Mrs. Marian Nicholls (third)

NEW ELECTRICAL EQUIPMENT

Balancing Equipment

A dynamic balancing equipment, Type 1254, has been introduced by DAWE INSTRUMENTS, LTD., 99, Uxbridge Road, London, W.5. Measuring only 8½in by 13in by 12¼in high and weighing 19 lb, it is fully portable and provides means for accurate dynamic balancing of the largest rotors.

The equipment, which is mains operated, incorporates the necessary sensing and measuring circuits, but the rotor runs in its own bearings, under its own drive. The operator holds the sensing probe, a velocity-type vibration pick-up, in contact with a bearing and reads the vibration due to unbalance on the meter on the instrument. A stroboscope forming part of the equipment is triggered at the vibrational frequency, so that the rotor shaft appears to be stationary. This enables the point of unbalance to be determined. A known mass is then attached to the rotor and another set of vibration readings taken. By plotting the two sets of readings on a polar diagram provided for this purpose, the necessary correction for unbalance is easily established.

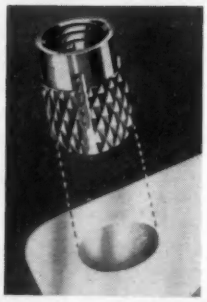
Dawe Type 1254 dynamic balancing equipment, with pick-up (left) and stroboscope (right)

Loudspeaker System

A high-fidelity loudspeaker system, the "Baby Periphonic," planned for the average-sized living room, has been introduced by the GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, W.C.2. For the bass performance, at frequencies below 1,500 c/s, the system uses two G.E.C. metal cone loudspeakers mounted one behind the other in a totally enclosed cabinet. Frequencies above 1,500 c/s are applied to two "presence" units mounted in the front of the cabinet. The cabinet is 22in wide by 21in high by 14¾in deep.

Self-Locking Insert

A product hitherto manufactured in the United States and now being produced under licence in this country by the PRECISION SCREW & MANUFACTURING CO., LTD., Union Street, Willenhall, Staffs., is known as the "Banc-Lok" self-locking insert. Especially engineered for use in wood, plastics, castings and moulded parts, it is available in aluminium, brass, steel, and stainless steel, in a wide range of sizes and designs. By eliminating the task of positioning inserts in moulds, these inserts are claimed to have helped to reduce costs of many plastic products. The company also supplies "Banc-Lok" tapped holes for providing threads in all kinds of sheet metal too thin to tap.

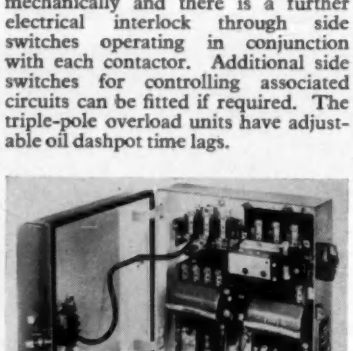


Precision "Banc-Lok" self-locking insert

Reversing Starters

A range of direct-to-line reversing starters, incorporating vertical-lift contactors similar to those in the company's XB and XC non-reversing types has been introduced by the GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, London, W.C.2, for starting motors of from 1 h.p. to 12½ h.p.

The four-pole forward and reversing contactors are interlocked mechanically and there is a further electrical interlock through side switches operating in conjunction with each contactor. Additional side switches for controlling associated circuits can be fitted if required. The triple-pole overload units have adjustable oil dashpot time lags.



G.E.C. reversing starter

Any starter can be supplied with a cam-operated double-break, triple-pole interruptor switch capable of breaking the stalled motor current. The 10 h.p. and 12½ h.p. sizes have a plug-in mounting which permits removal without disturbing incoming and outgoing cables. "Forward," "Reverse" and "Stop/Reset" buttons are mounted on the case for local control, or motors may be controlled remotely by push-buttons or pilot switch. An ammeter can be fitted on top of the case if required, and accommodation for control fuses is available inside the starter.

Telephone Repeater

A Dictaphone telephone repeater announced by the DICTAPHONE CO., LTD., 17-19, Stratford Place, London, W.1, has been developed to permit recorded telephone messages to be played back into the telephone line to a third party. It is designed to fit under the company's "Time-Master" dictating machine with telephone receiving facilities. Plugs are provided to fit into the power hand microphone and telephone input receptacles of the "Time-Master." The machine clutch is operated either by a remote switch, or by removing the handset from the telephone in the case of certain Post Office instruments. This means that the machine can be installed remotely from the user, for instance, at the telephone switchboard.

A buzzer is fitted so that when the machine is installed away from the user, the machine operator's attention can be attracted to switch the machine from telephone-recording position to reproduce as necessary. Only a very minor wiring change is required in the "Time-Master" with telephone receiving facilities when used with this accessory.

Cable Stripping Pliers

Roller type cable stripping pliers introduced by CREATORS, LTD., Plansel Works, Sheerwater, Woking, Surrey, are specially designed to remove the insulation from electric cables of ¼in to ¾in diameter. The cable passes over an aluminium V-pulley in one of the jaws and is guided in a straight

Creators' cable stripping pliers

line along the inside of a shaped handle. The other jaw carries a replaceable steel stripping blade and an adjustable and lockable stop-screw which prevents the blade from cutting into the cable core.

Three blade positions and two roller positions are provided to accommodate cables of different diameters, and the blade clamping plate can be adjusted to limit the depth of the cut. Two sizes of roller are available, the smaller for cable diameters from $\frac{1}{8}$in to $\frac{3}{8}$in and the larger for diameters from $\frac{3}{8}$in to about $\frac{3}{4}$in; rollers for special cable sections can be made up as required. The retail price is £2 7s 6d.

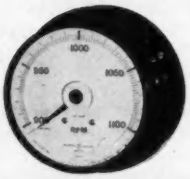
Coil Winding Machine

An automatic coil winding machine, Type WPA, has been developed by Aumann, Loehne, Germany, for mass producing coils on which auxiliary operations have to be performed. It is available in this country from R. H. COLE (OVERSEAS), LTD., 2, Caxton Street, London, S.W.1. Considerable reductions in winding times are achieved by the sequential winding arrangement, which enables the operator to carry out all manual operations as well as the removal of the completed coils without stopping the machine. It is also suitable for winding unsupported coils, e.g. field coils, and for flanged formers, provided the same gauge of wire is used throughout and paper-interleaving and intermediate tappings are not required.

A solid base-plate carries a 6- or 8-position indexing table and a headstock with a wire guide pulley on a rotating face-plate. The wire from the take-off stand is led through the hollow drive spindle and around the pulleys and is attached to the coil former on the indexing table. The final pulley rotates around the jig and serves as wire guide to produce the coil. On reaching the preset number of turns the machine switches off automatically. After the counter has been reset, the indexing table automatically moves to the next station, the wire takes up its initial position on the former and a new winding is produced as before. This cycle of operations is continuously repeated and the operator has only to remove the completed coils and replace the formers. As the machine cannot restart before the counter is reset, it is impossible for the indexing table to move whilst the operator is handling a coil.

Speed Indicator

A short-range speed indicator introduced by CROMPTON PARKINSON, LTD., Crompton House, Aldwych, London, W.C.2, uses a transmitter which generates an alternating current. Since the frequency and voltage vary in a linear relationship with speed, by inserting a frequency-sensitive network between generator and indicator it is possible to provide a scale which



Crompton Parkinson short-range tachometer

covers only a selected narrow range of speeds.

The three-phase output from the tacho-generator is divided into two circuits per phase. One circuit of each phase contains an inductor and in this way a substantially constant reference voltage is obtained at any speed covered by the range of the instrument. The other circuit of each phase includes a resistor and provides a current proportional to the absolute speed. Each of the two circuits is fed into a three-phase full-wave rectifier; the two d.c. outputs from the rectifiers are applied, in series, to the indicator which measures the difference between them.

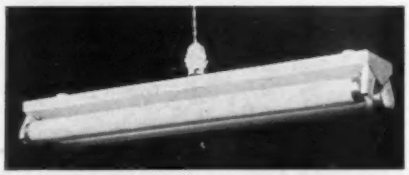
Personal Fan

The Frost model 750 personal fan, suitable for table or desk use, or mounting on a wall, has been introduced by H. FROST & CO., LTD., Fieldgate, Walsall. It is designed in a contemporary style and finished in attractive two-colour schemes, either blue and white or pink and white. The body of the fan is in colour, the 7in diameter impeller is of soft white polythene and the stand and base are white stove enamelled. A tilting device enables the air stream to be directed. The price is £2 17s 11d including purchase tax in the United Kingdom.

Electrolyte Conductivity Control

The Type RC4 conductivity controller made by ELECTRONIC SWITCHGEAR (LONDON), LTD., 47, Victoria Street, Westminster, S.W.1, is intended primarily for permanent installation on processing plant. It can be arranged to signal, or to effect corrective action, when the continuously monitored conductivity of an electrolyte reaches a predetermined value. The instrument may also be used to make periodic measurements to enable the state of the process at any time to be accurately appraised.

The controller is connected to a measuring cell that is immersed in the electrolyte, or which forms a part of the pipeline carrying the electrolyte. Electrical conduction takes place through a precisely known volume of the solution, the volume being determined by the dimensions and spacing of the electrodes. Small variations in the concentration of weak acids, or in the content of soluble inorganic impurities in water, produce substantial conductivity changes that are sensitively detected by the instrument



"Brite-lite" twin fluorescent fitting (Bradley Stone & Co.)

Frost model 750 personal fan

and are thereby caused to actuate a relay which may be connected as required to operate visual or audible signals. For automatic control the relay may switch valves or pump motors related to the transfer of additives, or the admission or withdrawal of solution to or from the system.

The controller embodies many advanced design features, such as a precision a.c. Wheatstone measuring bridge. The bridge is supplied at low potential at a frequency of 1,000 c/s; this eliminates inaccuracies due to polarisation which would otherwise be present at low frequencies.

The largest field of application is related to the purity of distilled and demineralised water and steam condensate in boiler plant operation.

Plug-in Fluorescent Fitting

A complete fluorescent fitting provided with an adaptor enabling it to be plugged into any b.c. holder is now being distributed by BRADLEY STONE & CO., 24, Parkway, London, N.W.11. The fitting, named the "Brite-lite," is made of aluminium and ranges in weight from 26 to 40 oz. Both single and twin lamp versions in 2, 3 and 4ft sizes are available and prices range from £2 17s 8d to £5 8s including tubes.

Electrical Instruments

It is announced by the ELECTRICAL INSTRUMENT CO. (HILLINGTON), Boswell Square, Industrial Estate, Hillington, Glasgow, S.W.2, that all square Bakelite-cased moving coil instruments manufactured by the company can now be supplied with a stopping device to arrest the movement of the pointer at any desired moment. This is effected by a spring-loaded plunger in connection with a solenoid.

Financial Section

STOCKS and SHARES

RELIEF over the avoidance of a railway stoppage has, of course, become mixed with anxiety about the news from France, the net outcome being little change at first in the general level of prices in the Stock Exchange, where the volume of business remained very restricted. By the beginning of this week, gilt-edged securities were managing to do rather better than hold their ground. Industrials were irregular, but mainly firm: in this market the chairman's review at the annual meeting of I.C.I. was read carefully as a general guide to this year's business prospects. Sir Alexander Fleck saw signs of some weakening of demand at home and abroad; but home turnover to date this year had not been unsatisfactory, while export sales were reasonably close to last year's, and the directors were not allowing present uncertainties to deter them from pursuing their long-term expansion plans.

Price Changes

A.E.I. shares remained subdued by the existence of the block of shares which has come to the market as a result of the company's acquisition of Associated Insulation Products from Elliott-Automation. Shares of the other big electrical groups moved within narrow margins. Crompton Parkinson were steady at around 9s in advance of the interim dividend declaration expected next Thursday (the 29th). Johnson & Phillips remained on the dull side, but Aberdare Holdings and Hackbridge Holdings were notably firm. On the strength of the proposed scrip issue, Mather & Platt added 1s 6d to the previous week's advance of 2s 3d. Other conspicuously good features included Dewhurst & Partners at 7s 6d, E.M.I. at 34s 9d and Murphy Radio at 12s 6d.

Enfield Cables

There has been a rise from 14s to 16s (with transactions recorded up to 17s 3d) in the price of Enfield Cables £1 shares since the company's annual meeting—all sections of the organisation were said in the report to have contributed to the substantial improvement in the financial results for 1957. As a consequence of this it was possible to resume dividend payments, with a 2½ per cent distribution, despite further heavy losses through the fall in copper prices. Credit was given by the chairman to the success of measures to improve the pattern of the business, as well as the efficiency of production methods. Of the outlook, Mr. Randall said it would be very difficult to improve this year on the manufacturing results, but hoped that the period of serious stock losses was at an end. To a question, he was reported to have replied that there was nothing definite to be said, one way or another, on the subject of a possible amalgamation of the company with another firm.

Brook Motors' Progress

Quoted at 37s 6d ex-dividend, the best price of the year, Brook Motors 10s shares have been well supported on

Price Changes in

Company or Board	Nom. Value	Middle price 19th May	Week's Rise or Fall	Dividend Previous	Dividend Last	Yield % £ s d	1958 Highest	1958 Lowest
Gilt-edged Stocks								
Brit. Elec. 1968/73	100	74½		3	3	4 0 6	75½	72
Brit. Elec. 1974/77	100	72	+½	3	3	4 3 3	72½	68½
Brit. Elec. 1976/79	100	75½		3½	3½	4 13 3	76	72
Brit. Elec. 1974/79	100	85½	+½	4½	4½	4 19 6	86	82½
Overseas Electric Supply								
Calcutta Elec.	£1	16/-		6†	6·8†	8 10 6†	16/9	15/-
East African Power	£1	18/6	−6d	7	7½	8 2 3	19/3	17/6
Nigerian Elec.	£1	15/-		10	10	13 6 9	17/-	14/9
Perak Hydro-Elec.	£1	14/6	+6d	10	12½	17 4 9	15/6	14/-
Electrical Shares								
Aberdare Holdings	5/-	11/6	+6d	17½	17½	7 12 3	11/6	9/9
Aerialite	1/-	6/3		48	51½	8 4 9	6/9	5/1
Allen, W. H.	£1	34/6		10	10	5 16 0	35/-	32/9
Anglo-Portuguese Tel.	£1	25/9		8	9	6 19 9	25/9	19/9
Aron Elec. Ord.	£1	53/9		15	15	5 11 6	54/6	53/-
Assoc. Elec. Ord.	£1	48/-	−9d	15	15	6 5 0	51/3	46/6
Automatic Tel. & El.	£1	60/9		17	17	5 11 9	66/3	57/-
Babcock & Wilcox	£1	48/-	−9d	15	13‡	5 8 3	52/9	41/9
Bakelite	10/-	19/-		15	15	7 18 0	21/-	17/6
Baldwin, H. J.	2/-	2/9		20	20	14 10 9	3/9	2/9
Berry's Electric	5/-	7/-		—	10	7 2 9	7/6	5/9
British Aluminium	£1	37/-	−1/-	12	12	6 9 9	47/-	37/-
Brit. Elec. Traction: Def. Ord. "A"	5/-	24/-	+1/6	22½	25	5 4 3	24/-	19/6
B.I. Callender's	£1	42/-x.d.		12½	12½	5 19 0	44/6	38/9
B.I. Callender's 6% Pref.	£1	19/6		6	6	6 3 0	20/3	19/6
British Tabulating	£1	45/-		9	10	4 9 0	45/9	38/6
British Thermostat	5/-	26/3	+1/3	25	30	5 14 3	26/3	19/9
British Vac. Cleaner	5/-	4/9		10	10	10 10 6	5/3	4/6
Brook Motors	10/-	37/6x.d.	+3d	25	25	6 13 3	37/6	33/3
Bulgin, A. F.	1/-	5/-		40	45	9 0 0	5/6	4/7
Bulpitts	5/-	7/6		—	12½‡	8 6 9	7/6	7/6
Burco Dean	5/-	9/-	−6d	20	22½	8 6 9*	9/6	7/9
Cable & Wireless: Ord.	5/-	10/-		10	10†*	5 0 0	10/-	8/-
4% Loan	100	94		4	4	4 5 0	94½	89
Chloride El. Storage "A"	£1	58/-	−9d	17½	17½	6 0 9	62/-	55/6
Clarke Chapman	£1	112/6		27½	27½	4 17 9	7½	5½
Cole, E. K.	5/-	17/6		17½	17½	5 0 0	18/-	15/6
Cossor, A. C.	5/-	4/6	−3d	Nil	2½	2 15 6	5/6	4/4
Crabtree	10/-	26/-		20	20	7 13 9	26/3	24/4
Crompton Parkinson Ord.	5/-	9/-		16	16	5 18 6*	10/3	8/3
De La Rue	10/-	24/-	+9d	30	35	7 5 9*	25/3	20/9
Decca "A"	4/-	24/6x.d.		43½	43½	7 2 9	27/6	21/3
Desoutter	5/-	14/6		32½	18½*	6 9 3	14/6	13/6
Dewhurst	2/-	7/6	+6d	16½	20	5 6 9	7/9	6/9
Dictograph Tel.	2/-	5/9		20	20*	6 19 3	6/-	4/7
Dubilier Condenser	1/-	3/6		30	30	5 14 3*	3/9	3/1
Duport	5/-	8/3	−3d	25	25	7 11 6*	9/4	8/-
E.M.I.	10/-	34/9	+1/3	15	15	4 6 3	34/9	27/6
Electrical Components	5/-	7/6		25	12½*	8 6 9	8/-	7/-
Elec. Construction	£1	21/3		8½	8½	8 0 0	22/9	21/-
Elliott-Automation	5/-	13/3x.d.		—	10‡	3 15 6	13/9	11/6
Enfield Cable Ord.	£1	16/-	+2/-	Nil	2½	3 2 6	17/-	10/9
English Electric	£1	52/6	−1/3	14	14	5 6 9	56/3	44/-
English Electric 3½% Pref.	£1	12/3		3½	3½	6 2 6	12/3	11/9
Ericsson Tel.	5/-	20/3	+3d	22†	12*†	2 19 3†	21/-	17/6
Ever Ready	5/-	15/9	+3d	35	37½	5 19 0*	16/-	13/9
Falk Stadelmann	£1	38/9		17½	17½	9 0 9	38/9	35/-

The above quotations are based upon middle prices in the Stock Exchange Daily Official List.
* After scrip issue. † Free of income tax. ‡ Dividend indicated.

satisfaction with the figures in the company's interim report covering the first half of the financial year ending next September. At nearly half a million, the group profit (after depreciation) was fully 40 per cent above that for the corresponding half of 1956–7, and the net surplus, despite a much heavier tax provision, improved in only a slightly lower ratio to £244,000. For the full year to last September the company earned £380,000, after tax, and the total dividend of 25 per cent was paid from earnings equivalent to 90 per cent gross on the £721,000 ordinary capital. On the basis of that distribution the yield on the shares is nearly 6¾ per cent. For the current year the interim dividend is being repeated at 5 per cent.

Electrical Investments

Company or Board	Nom. Value	Middle price 19th May	Week's Rise or Fall	Dividend Previous	Dividend Last	Yield % £ s d	1958 Highest	1958 Lowest
Electrical Shares—continued								
G.E.C. Ord.	£1	30/-	−1/3	14	12½	—	38/9	29/3
G.E.C. 6½% Pref.	£1	20/6		6½	6½	6 6 9	21/3	20/3
General Cables	5/-	11/9		30	24	10 4 3	11/9	11/-
Greenwood & Batley	£1	47/3	−3d	17½	17½	7 8 3	48/-	45/-
Hackbridge Holdings	5/-	13/3	+6d	30	20	7 11 0	13/3	7/6
Hackbridge & Hewittic	5/-	12/-		23	20	8 6 9	12/-	9/7
Head Wrightson	5/-	18/3	+6d	20	22½	—	19/-	16/9
Heatrae	2/-	5/6		15	20	7 5 6	5/6	4/-
Henley's	10/-	12/-x.d.	+6d	11½	11½	9 11 9	14/6	10/6
Holophane	5/-	13/6		30	37½	8 6 9*	13/9	12/6
Hoover	5/-	39/-		50	50	6 8 3	40/6	31/-
I.C.I.	£1	43/9		10	12	5 9 6	45/-	35/6
Intl. Combustion	5/-	23/6		22½	25	5 6 6	24/6	19/3
Johnson & Phillips	£1	18/9x.d.	−9d	10	5	5 6 9	25/-	15/-
Lancashire Dynamo	£1	36/3		11	11	6 1 3	37/6	28/6
Laurence, Scott	5/-	13/9x.d.	−6d	15	15	5 5 3	14/9	12/6
Lister, R. A.	£1	24/3		10	10	8 5 0	26/3	23/-
London Elec. Wire	£1	42/6	+6d	12½	12½	5 17 9	43/9	39/6
Lucas, J.	£1	33/-		7½	7½	4 11 0	33/3	27/9
Marconi Marine	£1	32/-		10	10	6 5 0	32/-	29/-
Marryat & Scott	2/-	12/-		30	35	5 16 9	12/-	10/3
Mather & Platt	£1	58/-	+1/6	15	15	5 3 6	58/-	43/9
Metal Industries	£1	29/-		Nil	9	6 4 3	30/-	22/9
Midland Elec. Mfg.	£1	45/-		12½	12½	5 11 0	48/3	44/-
Morphy-Richards	4/-	16/9		50	20*	4 15 6	16/9	14/6
Murex	£1	54/3		20	20	7 7 6	57/6	53/3
Newman Ind.	2/-	2/3x.d.		10	10	8 17 9	2/9	2/3
Oldham & Son	1/-	2/6		17½	17½	7 0 0	2/7	2/3
Parnall (Yate)	5/-	12/6x.d.	+9d	12	12	4 16 0	12/6	5/9
Parsons, C. A.	£1	44/6	−6d	8½	7½*	3 7 6	53/6	43/-
Plessey	10/-	56/3	−6d	30	30	5 6 9	59/-	55/-
Pye "A" Deferred	5/-	12/6	−6d	12½	12½	5 0 0	13/9	10/-
Reyrolle	£1	78/9		17½	17½	4 9 0	84/6	73/6
Rheostatic	4/-	6/-	−3d	12½	12½	8 6 9	8/-	6/-
Richardsons Westgarth	10/-	14/6		16⅔	16⅔	5 15 0*	15/-	13/-
Scottish Cables	4/-	12/9	−3d	27½	27½	8 12 6	13/9	12/3
Simon-Carves	5/-	25/-x.d.	−1/3	20	25	5 0 0	27/9	22/6
Smith (England), S.	4/-	8/6		17½	20	4 14 3*	8/6	7/-
Southern Areas	£1	10/-	−3/9	7½	Nil	Nil	13/9	9/6
Strand Elec.	5/-	4/9	−3d	15	15	15 15 9	6/3	4/9
Sturtevant	5/-	15/3		15†	15†	4 18 3†	18/-	15/3
Sun Elec.	£1	47/6		25	25	10 10 6	47/6	47/3
Switchgear & Cowans	5/-	11/-		25	22½	10 4 6	11/9	8/9
Taylor Tunnicliff	5/-	13/3	+6d	15	17½	6 12 0	13/9	11/9
T.C.C.	10/-	35/-		25	25	7 2 9	38/6	35/-
T.C. & M.	£1	24/-	−6d	8½	8½‡	7 1 9	27/-	20/-
Telephone Mfg.	5/-	4/9		10	10	10 10 6	5/2	4/6
Telephone Rentals	5/-	10/9x.d.		12½	12½	5 16 3	11/-	9/9
Thompson (John)	5/-	24/6		25	25	5 2 0	27/-	23/-
Thorn Elec. "A"	5/-	18/-		15	17½	4 17 3	18/6	17/-
Thornycroft	£1	25/9		12½	12½	9 14 3	27/9	21/-
Tube Investments	£1	51/9x.d.	+9d	13½	15	5 16 0	54/6	48/3
Vactric	5/-	14/6		17½	25	8 12 6	15/6	14/3
Veritys	5/-	5/3		12½	12½	11 18 3	6/9	5/3
Walsall Conduits	4/-	12/-		20	20	6 13 3	12/-	11/-
Ward & Goldstone	5/-	25/6		35	40	3 18 6*	26/-	23/6
Watford	2/-	6/9		25	25	7 8 3	7/-	5/-
Westinghouse	£1	37/6		18	10*	5 6 9	38/9	32/3
West, Allen	5/-	10/-x.d.	−3d	15	12½*	6 5 0	10/9	9/3
Wolf Electric	5/-	6/9		20	10*	7 8 3	9/-	6/9

Pye Debenture

Pye, Ltd., have issued £2½ million 6 per cent debenture stock, redeemable 1976–81, with the object of reducing temporary loans and of providing finance for developments in the export and home markets. Dealings have been taking place at a premium of about a point on the price of 98 at which the offer was made to the company's shareholders, so that the yield to a present buyer is a fraction over 6 per cent. The stock is £25 per cent paid-up, with a further instalment of the same amount due by 6th June and the final call of £48 per cent by 4th July. Meanwhile it is transferable free of stamp duty. Net assets of the group are about 3½ times the principal amount of this issue and other charges; and the combined annual interest requirements are covered some seven times on the basis of the company's estimate of earnings for the year ended last March, which are expected to come out rather below those of the previous year.

Company News

British Thermostat 5s shares were marked up from 25s to 26s 3d through satisfaction with the results for the past year. With the net profit £90,000 higher than before at £387,000 (despite an £80,000 increase to £408,000 in the tax charge) the company is adding a 5 per cent bonus to the final dividend, bringing the total distribution for the year to 30 per cent. This still appears to leave more than three-quarters of the profit to be ploughed back into the already very substantial reserves. A one-for-two scrip issue was made three years ago. The shares are now on a 5¾ per cent yield basis. Southern Areas £1 shares were marked back to 10s after the decision to pass the dividend. Parnall (Yate) 5s shares, which had risen from 7s 6d to 13s after the preliminary announcement of negotiations for a merger with Radiation, lost some of the improvement when the terms were published.

Burco Dean Interim

An interim dividend of 5 per cent declared by Burco Dean on account of the year ending next September applies to ordinary capital increased to £769,000 by a one-for-two scrip issue, and is equal in effect to the 7½ per cent paid a year ago on the smaller capital. Assuming a proportionate reduction also in the rate of the final dividend due in December, the total will be 15 per cent and the yield on the 5s shares about 8½ per cent at their recent quotation of 9s. A statement accompanying the interim declaration reports that an increase in sales during the first half of the year in comparison with 1956–57 is continuing, but adds that margins of profit have narrowed.

REPORTS and DIVIDENDS

W. T. Henley's Telegraph Works Co., Ltd.—The report and accounts for 1957 now issued confirm the preliminary figures given in our issue of 9th May. The directors in their report state that, apart from the business of the former subsidiary, Henley's Tyre & Rubber Co., Ltd., the turnover of the group during 1957 again exceeded that of the previous year, which was itself a record. All the shares in Henley's Tyre & Rubber Co., Ltd., were sold to the Avon India Rubber Co., Ltd., as at 31st December last and this company is continuing in business as a subsidiary of the Avon Co. The manufacturing space at Gravesend thus made available is being used for the cable and engineering business of Henley's.

In South Africa, Henley's (South Africa) Telegraph Works Co., Ltd., has had for some time a working arrangement on a limited scale with the Simplex Electric Co. (South Africa) (Pty.), Ltd., a subsidiary of Tube Investments, Ltd., for the provision of certain accessories. The directors have decided, in agreement with Tube Investments, Ltd., and their subsidiaries concerned, that the business in South Africa should be merged in a new jointly and equally owned company, Henley-Simplex Africa (Pty.), Ltd. The arrangement came into effect on 1st January.

The Chloride Electrical Storage Co., Ltd.—The main figures in the accounts for 1957 were given in our issue of 25th April. In his circulated statement Mr. A. W. Browne (chairman and managing director) says that there was a small reduction during the year in the turnover of the home battery companies and a continuance of the increase in the sales of their overseas battery companies and in the sales of the home companies concerned with products other than batteries. The net result is an increase in the total group sales. Income from trading, however, has fallen. For a business such as theirs the stocks of lead which have to be maintained to cover their manufacturing requirements are considerable and as the price of this metal fell appreciably during the year there was a consequent reduction in the value of their stocks at the year end. This factor, coupled with the continued pressure of increased competition, rising costs of wages and salaries and the difficult trading conditions in the early part of the year, had an adverse effect on profits.

The continued expansion of their manufacturing activities overseas has inevitably reduced the export demand on their home factories and this factor coupled with the increasing efficiency of their major United Kingdom factories has enabled them to rationalise their production in this country. They have decided to cease production at two of their smaller factories (Dukinfield and Alton) and transfer this production to the remaining companies of the group.

Their turnover in the stationary battery market improved, as did the class coming under the heading of miscellaneous batteries. The demand for automotive batteries was depressed considerably during the first three months of the year as a result of petrol rationing following the Suez crisis; once that trouble was passed the demand went ahead steadily. A direct result of petrol rationing was an increase in the demand for battery electric vehicles and trucks of all descriptions to the benefit of the group traction battery turnover.

In the aggregate the overseas companies expanded their sales during the past year but, as with the home battery companies, the trading results have not kept in line except in the case of India, South Africa, Holland and Denmark, where good progress has been made. In Pakistan and Southern Rhodesia the new manufacturing plants will commence production this year and should soon begin to contribute to the group profits.

G. & J. Weir, Ltd.—The annual meeting will be held on 4th June. In his circulated statement, the Hon. J. K. Weir (chairman), says that the fall in the trading balance for 1957, as compared with 1956, is due to a number of causes. These include the continued rise of wage levels and keener competition, a change in the composition of the output which had an adverse effect, as it carried a higher proportion of less remunerative contracts, the incidence of the engineering strike, the group output which did not come up to the expected level, and a reduced demand for public authority housing in Scotland.

Hitherto the parent company has functioned in a dual capacity, as it has been both a trading and a holding company. It is proposed to separate these two functions which will enable the board of the holding company to concentrate on policy matters affecting the group and leave the purely trading functions at Cathcart in the hands of the local board. Proposals to this end are being submitted to stockholders at an extraordinary meeting which will follow the annual meeting.

The output of G. & J. Weir during the year of new work and repairs, exceeded the record level established in 1955. Nevertheless they failed to attain the target which they had planned to reach, this being largely the result of the strike in March and April last year. Substantial progress has been made in the power station field and in addition to a contract for condensing plants for Skelton Grange "B" station, they secured contracts for a number of large boiler feed pump installations for the C.E.G.B. and the South of Scotland Electricity Board. In addition they obtained feed pump contracts for the nuclear power stations at Berkeley, Hunterston and Hinkley Point. They also secured orders for feed pumps for the Richard L. Hearn stations of the Ontario Hydro-Electric Board, and they have been entrusted by the Crown Agents for the Colonies with a contract for a large evaporating and distilling plant for the island of Nassau. After referring to the progress in research and development, the chairman deals with the activities of the various companies in the group.

Mavor & Coulson, Ltd.—The annual meeting was held in Glasgow on 15th May. The report of the directors submitted to the meeting states that turnover and profits both increased during 1957 and would have been greater but for the engineers' strike in the spring of last year and the influenza epidemic in the autumn. The extension to the structural works at East Kilbride was completed in August. In South Africa the additional bay at the Germiston Works has been in use since July, and the results of the subsidiary company there are satisfactory and encouraging for the future. In Dalmarnock foundry a new sand-handling plant and a mains frequency electric furnace were installed during the year. At Bridgeton demolition of the block of old buildings purchased in 1956 started at the end of 1957. The site is now clear and work on the foundations of the new building has begun. It is expected that part of the new building will be available for manufacture by the middle of 1959. This extension will cost some £600,000. Orders booked in 1957 showed an increase on those booked in 1956 and will provide a steady load on the factories during 1958. There is still a strong demand for mining machinery and mechanical handling equipment both from home and from overseas, where the principal markets are in Australia, South Africa and India.

T. Clarke & Co., Ltd.—In his review of the company's activities which has been circulated with the report and accounts for 1957, Mr. A. J. Shrosbery (chairman and managing director) says that the general recession of business during the year has only affected the company's affairs slightly. Although the volume of business has increased substantially there is a tendency for prices to become more competitive, with a consequent reduction in profit margins. The company has full order books and continues to carry out work both at home and overseas on a broad basis, covering the execution of electrical construction work in every phase of industry varying from atomic plants, engineering and industrial works, power stations, etc., to commercial buildings. Mr. Shrosbery mentions that the name of the subsidiary com-

pany, J. B. Saunders, Ltd., has been changed to T. Clarke (Wales), Ltd. This company is being steadily developed and has shown a reasonable profit for the year.

Radiation-Parnall (Yate) Merger.—The directors of Radiation, Ltd., and Parnall (Yate), Ltd., have agreed that the proposed merger can best be effected by Radiation making an offer for the acquisition of the £750,000 issued capital of Parnall (Yate) on the basis of 12s in cash and one £1 ordinary share in Radiation for every two Parnall 5s ordinary units. The existing board of Radiation will be increased by four directors from the existing board of Parnall. Of these four directors, three are full-time executive directors, including Mr. F. P. S. Stammers, who will become managing director of Radiation, while retaining the similar position which he already holds with Parnall (Yate). Mr. A. J. Parker will become a vice-chairman of Radiation.

The Southern Areas Electric Corporation, Ltd.—The consolidated profits for 1957 were £26,854, as compared with £82,390 for 1956. Taxation absorbs £16,552 (£46,838) and after adding surplus taxation for preceding years of £1,565, the net profit is £11,867 (£44,930), of which £11,490 is dealt with in the accounts of the holding company. It is not proposed to pay any dividend for the year (against 7½ per cent). The balance brought forward is £284,751, to which has been added the net profit of £11,867 and from which has been deducted transfer to general reserve of £200,000 and further amounts written off development totalling £10,000, leaving £86,618 to be carried forward. It is stated that the reduced volume of orders received from both Government Departments and commercial customers at a time of rising costs was mainly responsible for the reduction in profits.

Brook Motors, Ltd.—A statement for the six months to 31st March last shows a trading profit and other revenue of the parent company of £573,588, as compared with £410,216 for the corresponding period of the previous year. After meeting a loss on trading of the American subsidiary of £12,198, depreciation of £62,135 and taxation of £255,613, the net balance is £243,642 (£177,363). An interim dividend of 5 per cent (unchanged) has been declared.

Relay Exchanges, Ltd.—In the course of his review for 1957 Sir Walter J. Womersley, Bt. (chairman), says that during the year a considerable expansion into new areas took place, and the company has a development programme for the next two years which should result in steady continuing growth in strength of organisation and resources and a general improvement throughout the whole structure of the business. Nevertheless, the directors anticipate that the lively competition in the rental field will increase over the next few years with some effect on profit margins. Expansion of business into new towns does not immediately result in profit to the company. There is still a large reservoir of potential customers who will be able to be drawn upon when hire-purchase restrictions are removed or eased.

Taylor Woodrow, Ltd.—In his review of 1957 Mr. F. Taylor (chairman and managing director) says that last year he referred to their collaboration with the English Electric Co., Ltd., and Babcock & Wilcox, Ltd., in the design and construction of nuclear power stations of the gas-cooled graphite moderated type. Their group, in association with the Central Electricity Generating Board, has designed the world's largest nuclear power station at Hinkley Point. Work on this project is now well in hand. Their other major power station works at Castle Donington, High Marnham and Northfleet are all progressing well and are in advance of schedule.

The Atlas Electric & General Trust, Ltd., reports that, subject to audit, the gross investment income for the year to 31st March last is £1,115,203, as compared with £1,059,886 for 1956-57, to which is added other income making a total of £1,240,042. After meeting all charges, including £519,405 for taxation, the net revenue is £583,423 (against £547,268). General reserve receives £150,000 and it is proposed to pay a final ordinary dividend of 9 per cent (against 7½ per cent), making 12 per cent (10½ per cent) for the year. The balance carried forward is £288,292 (against £264,234 brought in).

Richard Johnson & Nephew, Ltd.—The trading results for the year to 29th March last show a group net profit, after providing £840,530 for taxation, of £907,388, as compared with £805,840 for the previous year. A sum of £30,000 is allocated as a special profit sharing bonus to workpeople, general reserve receives £720,413, and it is proposed to pay a final dividend of 4½ per cent, making 7 per cent for the year. For the previous year the total distribution was 8½ per cent, but the interim dividend for that year was paid on half the present capital.

Telephone Rentals, Ltd.—The group profit for 1957 is £487,176, as compared with £421,892 for 1956. The dividend for the year is maintained at 12½ per cent with a final payment of 7½ per cent, but the interim dividend in 1956 was paid on smaller capital.

The British Thermostat Co., Ltd., reports that after providing £81,072 for depreciation and £407,845 for taxation, the group net profit for the year ended 31st January last is £387,433, as compared with £296,909 for the preceding year. It is proposed to pay a final dividend of 17½ per cent (unchanged) and in addition to pay a bonus of 5 per cent, making 30 per cent for the year (against 25 per cent).

Associated Electrical Industries, Ltd., has declared an interim dividend of 2½ per cent (unchanged).

S. Smith & Sons (England), Ltd., are paying an interim dividend of 3½ per cent (against 5 per cent) on doubled capital.

Burco Dean, Ltd., has announced an interim dividend of 5 per cent (against 7½ per cent) on increased capital.

Radio Rentals, Ltd., has announced an interim dividend of 10 per cent (against 7½ per cent) on larger capital. The increase is to equate to a greater degree the interim and final dividends.

Increases of Capital

Electronic Instruments, Ltd.—Increased by £55,000 in £1 ordinary shares, beyond the registered capital of £45,000.

Service Electric Co., Ltd.—Increased by £22,500 in £1 ordinary shares, beyond the registered capital of £7,500.

Pantiya Electronics, Ltd.—Increased by £170,000 in 2s ordinary shares, beyond the registered capital of £30,000.

Hardman & Co., Ltd.—Increased by £60,000 in £1 ordinary shares, beyond the registered capital of £20,000.

Creed & Co., Ltd.—Increased by £450,000 in £1 ordinary shares, beyond the registered capital of £800,000.

British Communications Corporation, Ltd.—Increased by £150,000 in £1 7½ per cent redeemable cumulative preference shares, beyond the registered capital of £10,000.

Bankruptcies

W. R. Perkins, 25, Villiers Avenue, Twickenham, Middx., electrical contractor.—Public examination 18th July at the Court House, Half Acre, Brentford.

C. A. Smith, lately carrying on business at 4, Gothic Arcade, Snow Hill, Birmingham, under the style of Birmingham Electrical Co., electrical contractor.—Application for discharge to be heard on 3rd June at the Court House, Corporation Street, Birmingham, 4.

T. A. Flowers, residing and lately carrying on business at 20, Riversdale Road, West Cross, Swansea, Glam., electrical contractor and sales representative.—Trustee, Mr. G. G. Thomas, 7-10, Oxford Buildings, Lower Union Street, Swansea, appointed 6th May.

N. W. Ives, North Street, Burnham Market, Norfolk, radio, cycle and electrical engineer.—Last day for receiving proofs for dividend 24th May. Trustee, Mr. F. R. D. Walter, Castle Chambers, Opie Street, Norwich, Official Receiver.

C. P. Wheeldon, lately carrying on business at Bryn Awel, Brunswick Road, Buckley, Flintshire, and at 29-39, Mold Road, Buckley, electrical and general dealer.—Receiving order made 7th May on debtor's own petition. Public examination 10th July at The Castle, Chester.

M. McS. Colgan, lately carrying on business as a radio, television and electrical dealer under the name of East Central Television Services, at 70, Leytonstone Road, London, E.15, 87, Roman Road, E.2, 133, Bethnal Green Road, E.2, and 39, Water Lane, E.15.—First meeting 28th May and public examination 3rd July, both at Bankruptcy Buildings, Carey Street, London, W.C.2.

R. E. Kelly, lately carrying on business at 10-12, Holloway Head, Birmingham, 1, under the style of B.K. Electrical Co., manufacturer of electric fires.—Trustee, Mr. W. H. Haigh, Somerset House, 37, Temple Street, Birmingham, 2, Official Receiver, released 6th May.

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (3s 6d each including postage) will be obtainable after 28th May from the Patent Office, 25, Southampton Buildings, London, W.C.2

1954

10439. Electric & Musical Industries, Ltd. —Electron-discharge devices having ion trap arrangements. 28th March, 1955. (795803.)

21167. Soc. Nouvelle de l'Outillage R.B.V. et de la Radio-Industrie.—Electron valves. 20th July, 1954. (795804.)

22790. Siemens & Halske Akt.-Ges.—Voltage-dependent resistors. 5th August, 1954. (795724.)

22820. Bendix Aviation Corporation.—Electron multiplier. 5th August, 1954. (795663.)

23479. Elliott Bros. (London), Ltd.—Moving coil instruments. 12th August, 1955. (795806.)

33450. Remington Rand, Inc.—Magnetic amplifiers. 18th November, 1954. (795528.)

34683. Bendix Aviation Corporation.—Electric systems for indicating fluid flow. 30th November, 1954. (795721.)

1955

7272. Oldham & Son, Ltd., and Morton, H.—Electrical accumulators. 20th February, 1956. (Cognate application 31651, 4th November, 1955.) (795671.)

10969. General Electric Co.—High frequency wave transmission filters. 15th April, 1955. (795584.)

14630. Masson Seeley & Co., Ltd.—Production of printed electric circuits. 17th May, 1956. (795822.)

18324. Rutter, J. W., and Tiller, W. A.—Preparation of semi-conductive materials. 24th June, 1955. (795675.)

21035. British Thomson-Houston Co., Ltd.—Electromagnetic relays. 9th July, 1956. (795540.)

22862. Napier & Son, Ltd., D.—Electrical commutators. 8th August, 1956. (795825.)

23238. General Electric Co., Ltd.—Nuclear reactors. 1st August, 1956. (795826.)

23239. Decca Record Co., Ltd.—Radar apparatus. 7th August, 1956. (795542.)

23354. United Kingdom Atomic Energy Authority.—Lowering mechanisms. 10th August, 1956. (795511.)

23397. Crabtree & Co., Ltd., J. A., and Middleton, E.—Flameproof mounted electric switches. 20th July, 1956. (795543.)

23452. British Insulated Callender's Cables, Ltd.—Overhead electric traction systems. 14th August, 1956. (795682.)

23997. Radio Heaters, Ltd.—Radio frequency heating apparatus. 12th October, 1956. (795827.)

24583. M.S.S. Recording Co., Ltd.—Magnetic tape recording and reproducing system and apparatus. 24th August, 1956. (795617.)

26065. Metropolitan-Vickers Electrical Co., Ltd.—Electric motor control systems. 6th September, 1956. (795686.)

26319. General Electric Co., Ltd.—Thermally-operated electric cut-outs. 14th September, 1956. (795547.)

26332. Automatic Electric Laboratories, Inc.—Telephone dial mounting. 14th September, 1955. (795620.)

26509. Siemens & Halske Akt.-Ges.—Joints in coaxial cables. 15th September, 1955. (795548.)

26734. Shepherd, T. C. R.—Coupling devices for tubular elements. 7th December, 1956. (795549.)

27517. Associated Electrical Industries, Ltd.—Electron vacuum pumping systems. 10th October, 1956. (795551.)

29292. Revo Electric Co., Ltd.—Electric lighting fittings. 1st October, 1956. (795691.)

31234. Roller-Smith Corporation.—Electrical connector box. 1st November, 1955. (795798.)

31235. Roller-Smith Corporation.—Electrical distribution system. 1st November, 1955. (795799.)

31837. Crabtree & Co., Ltd., J. A., Wintle, T. D. G., and Jelley, G. A.—Contacts for electric switches. 29th October, 1956. (795696.)

32536. Sanders Associates, Inc.—High frequency electric transmission lines. 14th November, 1955. (795559.)

33802. Brush Electrical Engineering Co., Ltd.—Operating mechanism for electrical switchgear. 28th March, 1956. (795740.)

34096. Automatic Telephone & Electric Co., Ltd.—Telephone systems. 7th November, 1956. (795699.)

35263. Philips Electrical Industries, Ltd. —Frequency-demodulators. 8th December, 1955. (Addition to 758802.) (795561.)

35630. Plessey Co., Ltd.—Distortable container electric switch. 12th December, 1956. (795830.)

37071. American Seating Co.—Inertia-operated electric switches. 28th December, 1955. (795516.)

1956

2001. Technical Ceramics, Ltd.—Ceramic piezo-electric elements. 20th January, 1956. (795744.)

3219. Bendix Aviation Corporation.—Oscillator and amplifier circuit. 1st February, 1956. (795746.)

3269. United Kingdom Atomic Energy Authority.—Control mechanisms for nuclear reactors. 28th January, 1957. (795565.)

3626. Philips Electrical Industries, Ltd.—Thermionic dispenser cathodes. 6th February, 1956. (795566.)

3671. Telefonaktiebolaget L. M. Ericsson. —Telephone instruments. 6th February, 1956. (795831.)

5299. Hazeltine Corporation.—Balanced phase-detection system. 21st February, 1956. (795568.)

5622. Marconi's Wireless Telegraph Co., Ltd.—Fault protection systems for electrical apparatus. 16th October, 1956. (795567.)

5623. Telefunken Ges.—Neutralised transistor amplifiers. 23rd February, 1956. (795832.)

7645. Philips Electrical Industries, Ltd.—Electronic discharge tubes. 12th March, 1956. (795710.)

9312. United States Secretary of the Army.—Silver peroxide electrodes for primary batteries, and methods for making same. 26th March, 1956. (795834.)

10303. Svenska Aktiebolaget Gas-Accumulator.—Electric welding and soldering gun. 4th April, 1956. (795589.)

11135. Erie Resistor Corporation.—Condensers. 12th April, 1956. (795752.)

11346. Compagnie pour la Fabrication des Compteurs et Matériel d'Usines à Gaz.—Electric micromanometer. 13th April, 1956. (795753.)

13535. Cutler-Hammer, Inc.—Quick-acting lever-operated electric switches. 2nd May, 1956. (795754.)

15591. General Electric Co.—Electrical heating devices. 18th May, 1956. (795717.)

16669. Chardon, H. G.—Electric plugs. 30th May, 1956. (795756.)

17643. Compagnie Générale de Télégraphie sans Fil.—Storage tubes. 7th June, 1956. (795627.)

23725. Volochine, T.—Carrying out nuclear reactions. 1st August, 1956. (795596.)

25076. Just, A., and Just, M. R. (trading as Malco Tool & Mfg. Co.).—Electric wire terminals. 16th August, 1956. (795597.)

27049. Bendix Aviation Corporation.—Electrical quantity totalising systems. 30th November, 1954. (Divided out of 795722.) (795723.)

31194. General Electric Co.—Electron discharge devices. 12th October, 1956. (795602.)

34814. General Electric Co.—Washing machines. 14th November, 1956. (795853.)

38676. Westinghouse Electric International Co.—Arrangements for conducting electric current between relatively movable conducting members. 19th December, 1956. (795857.)

TRADE MARKS

APPLICATIONS have been made for the registration of the following trade marks. Objections may be entered up to 30th May:—

PHILIPS (design). Nos. 770,851-2. Class 8. Electric shaving instruments and parts.—Philips Electrical, Ltd., Century House, Shaftesbury Avenue, London, W.C.2.

EUMIG (design). No. 761,633. Class 9. Electro-technical apparatus and instruments; domestic electrical appliances; apparatus and instruments for transmitting and receiving sound; television apparatus; photo-electric cells; electric plugs, sockets and switches; insulated electric wire, etc.—K. Vockenhuber and A. Handler, trading as "Eumig" E.u.M., Vienna. Address for service, c/o Marks & Clerk, 57-8, Lincoln's Inn Fields, London, W.C.2.

AIRFLO. No. B771,128. Class 9. Electric suction cleaners and floor polishing machines. —Vactric, Ltd., 35, Sunbeam Road, London, N.W.10.

BITICINO (design). No. 771,316. Class 9. Electrical apparatus and parts.—Soc. per Azioni Bassani, Milan. Address for service, c/o Martin Jack & Co., 10, Lincoln's Inn Fields, London, W.C.2.

NUDISTRON. No. 772,253. NODISTRON. No. 773,556. Class 9. Electric discharge tubes for use in making up into apparatus for luminous display purposes.—Standard Telephones & Cables, Ltd., Connaught House, 63, Aldwych, London, W.C.2.

BAMBI. No. 773,319. Class 9. Electric flat irons.—Oliver Typewriter Manufacturing Co., Ltd., Victory Works, 80, Gloucester Road, Croydon, Surrey.

CINEFEX. No. 773,794. Class 9. Scientific and electrical apparatus and instruments.—Harold Godfrey, 108, Horseferry Road, London, S.W.1.

LEXION. No. 773,875. SELBROOK. No. 773,876. Class 9. Vacuum cleaners, combined cleaners and floor polishers, and vacuum dust extractors.—Turissa (Great Britain), Ltd., 101-9, Ladbroke Grove, London, W.11.

RECTA. No. 774,508. Class 9. Electrodes for electric arc welding.—Quasi-Arc, Ltd., Bridgewater House, Cleveland Row, St. James's, London, S.W.1.

TEL. No. 764,191. Class 11. Heating apparatus for domestic purposes.—Brattel Electric Co., Ltd., Arcade House, 27, Old Bond Street, London, W.1.

Great Orme Railway Conversion

Driving gear of the Great Orme Railway, Llandudno, has been converted from steam power to electric power. It was reported to the Llandudno Council that the work had been completed weeks ahead of schedule largely due to the efforts of the council officers, the railway manager and the contractors.

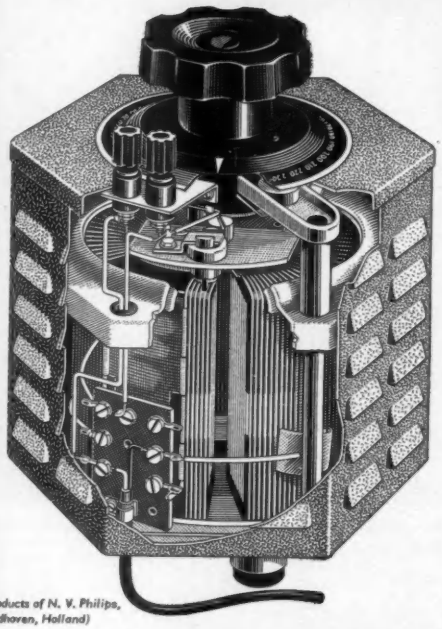
Wavey WASHERS

Beryllium Copper "Wavey" Washers. For Electronic Components. Range 10BA to ½" B.S.F. Corrosion resisting, non-damaging to components, higher resistance of "set", higher recovery of load, permanent spring action. They are fabricated from Beryllium copper, heat treated to VPN.350 minimum, Electro Plated to DTD.924, Cadmium Plated to DTD.904 and Passivated to DTD.923. Samples and price lists on request.

THE LEWIS SPRING CO. LTD. Resilient Works, Redditch
Tel.: Redditch 720 PBX
London Office: 122 High Holborn, W.C.1 Tel.: Holborn 7470 & 7479

LEAVE IT TO **Lewis** OF REDDITCH
SPRINGS, SPRING CLIPS
PRESSWORK, WIRE FORMS
VOLUTE SPRINGS

An A.C. voltage regulating problem? Here's the ready-made answer—



(Products of N. V. Philips, Eindhoven, Holland)

PHILIPS Stepless Variable Transformers

There are many applications for these handy transformers! Both bench and panel mounted types are available for use in the laboratory or for incorporation as standard components in manufacturers' equipment.

- **Continuously variable from zero up to 20% above input voltage**
- **Toroidally wound**
- **Extremely low "no load" losses**
- **Can be mechanically coupled for series, parallel or 3-phase (star connected) operation**
- **Generously rated**
- **Fully tropicalized**
- **Individual units rated up to 2 kVA**

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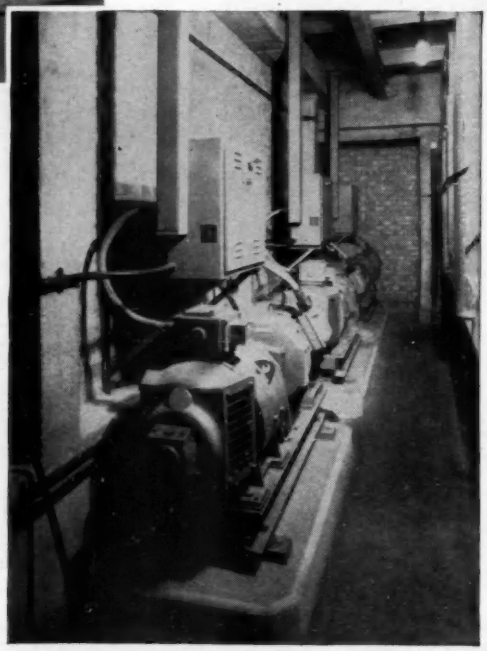
(RCL0363)

Metrovick Electronic Lift Control

In co-operation with G. K. Jensen & Co. Ltd., Metrovick electronic control variable voltage lift drives are installed in Barrington House, Gresham Street, London.

Faster operation, more accurate levelling, with increased passenger comfort are among the advantages of this system. Acceleration and deceleration are controlled, and maximum speed is maintained constant irrespective of the direction of travel or load in the cage.



Three of the seven 21 kW motor generator sets associated with each lift installation.

METROPOLITAN-VICKERS
ELECTRICAL CO LTD · TRAFFORD PARK · MANCHESTER, 17

An A.E.I. Company

Metrovick Motors for Trouble Free Service

JJC 703

NETHERLANDS ELECTRICAL TRADE

ANALYSIS OF IMPORTS AND EXPORTS IN 1957

THE past year was one of considerable difficulty and uncertainty in the Netherlands and events in Indonesia, the shortage of capital, the drain on foreign reserves, and the lack of skilled labour, all cast a gloom over the economy.

The products either exported or imported by Philips represent by far the biggest part of the Netherlands electrical trade. Of the total imports of some £68·5 million in 1957, radio and telecommunication equipment accounted for about £26 million. Dutch electrical exports last year amounted in value to £69 million, out of which £36 million was represented by electronic equipment.

It will be seen from the accompanying tables that the United Kingdom, Belgium, Sweden and West Germany were both Holland's main markets and her principal suppliers. Although the U.K.'s electrical exports to the Netherlands decreased slightly from £8·27 million in 1956 to £7·84 million last year, the Netherlands is still, after the Commonwealth countries and the United States, our best market. Dutch exports to the United Kingdom amounted to £2·95 million in 1956 and to £4·99 million last year. Trade in both directions consisted mainly of electronic equipment and domestic appliances. (£=10·4 Fl.)

Netherlands Electrical Imports and Exports by Countries, 1957 (000 Fl.)

Country	Imports	Exports
United Kingdom	89,966	56,112
Belgium/Luxembourg	211,890	118,265
France	25,812	34,848
West Germany	258,128	62,183
East Germany	2,055	116
Norway	899	11,839
Sweden	20,000	55,109
Finland	296	7,064
Denmark	11,661	22,805
Switzerland	47,107	22,725
Austria	9,208	16,180
Czechoslovakia	917	1,855
Hungary	678	2,265
Portugal	63	7,496
Spain	54	5,520
Italy	5,259	26,880
Yugoslavia	179	2,505
Greece	27	6,034
Poland	20	2,892
Turkey	7	4,131
Morocco	7	3,687
Egypt	213	8,568
Belgian Congo	10	2,399
Nigeria	41	2,254
Kenya & Uganda	19	1,645
South Africa	24	12,491
Rhodesia & Nyasaland	11	2,754
United States	37,376	31,460
Canada	1,426	9,686
Mexico	100	8,357
Guatemala	—	2,131
Bahamas	23	3,107
Colombia	41	9,992
Venezuela	7	13,554
Peru	15	6,162
Chile	9	3,138
Brazil	15	6,391
Argentina	14	8,491
Syria	38	2,271
Saudi Arabia	4	3,503
Iraq	5	5,116
Iran	5	6,415
Indonesia	121	18,226
Pakistan	15	2,892
India	20	10,705
Ceylon	5	2,487
Thailand	1	6,361
Malacca	2	3,095
Singapore & Malaya	27	4,292
Hong Kong	44	2,515
Australia	76	12,194
New Zealand	102	3,711

Netherlands Electrical Imports and Exports by Product, 1957 (000 Fl.)

Product	Imports	Exports
Motors, up to 10 kg	7,544	1,866
United Kingdom	2,016	48
Belgium/Luxembourg	1,472	199
West Germany	1,892	291
United States	723	200
Ditto, above 10 kg	31,206	8,701
United Kingdom	6,493	267
Belgium/Luxembourg	5,724	2,557
France	60	2,479
West Germany	13,444	1,325
Denmark	2,124	17
Switzerland	1,372	462
Transformers, up to 10 kg	9,519	4,840
United Kingdom	232	119
Belgium/Luxembourg	7,131	3,450
West Germany	1,557	213
Ditto, above 10 kg	19,029	3,060
United Kingdom	907	69
Belgium/Luxembourg	5,443	736
France	1,436	322
West Germany	7,741	561
Switzerland	3,290	229
Static convertors	10,239	7,351
United Kingdom	1,800	232
Belgium/Luxembourg	2,018	591
West Germany	4,129	746
Switzerland	1,097	886
Apparatus for regulating and distributing	74,702	30,530
United Kingdom	10,273	561
Belgium/Luxembourg	7,743	4,615
West Germany	23,706	2,880
Sweden	1,548	4,297
Switzerland	14,736	783
Austria	2,955	377
United States	7,325	41
Switchboards	40,932	20,893
United Kingdom	6,085	1,651
Belgium/Luxembourg	5,167	2,372
France	2,991	1,922
West Germany	11,371	4,703
Denmark	2,611	108
Switzerland	3,241	1,027
United States	7,231	741
Austria	613	1,006
Welding apparatus, above 10 kg	5,368	2,300
United Kingdom	294	379
Belgium/Luxembourg	953	386
West Germany	1,941	244
United States	1,241	—
Industrial furnaces	3,741	1,340
United Kingdom	350	50
Belgium/Luxembourg	62	225
West Germany	2,084	271
Cookers	1,054	168
United Kingdom	12	—
West Germany	697	25
Switzerland	266	—
Other heating appliances, n.e.s.	8,049	3,648
United Kingdom	875	109
Belgium/Luxembourg	680	1,854
West Germany	4,655	229
Refrigerators, up to 2 m³	18,040	515
United Kingdom	1,518	—
West Germany	7,569	81
Sweden	2,318	—
United States	1,348	—
Flat irons	2,433	220
United Kingdom	369	—
Belgium/Luxembourg	241	24
West Germany	1,701	—
Czechoslovakia	58	—
Household washing machines	21,505	5,573
United Kingdom	1,659	263
Belgium/Luxembourg	1,130	968
West Germany	17,739	283
United States	679	—
Vacuum cleaners	4,642	15,704
United Kingdom	561	1,542
Belgium/Luxembourg	1,050	2,795
West Germany	1,713	1,193
Sweden	1,121	2,317
France	—	1,177
Norway	—	1,689
Switzerland	—	1,062
Austria	—	1,376
Canada	—	1,094
Floor polishers	619	1,082
United Kingdom	94	—
Belgium/Luxembourg	1	436
West Germany	194	—
Sweden	293	26
Fans, table models	259	2,728
Electromagnets and electro-magnetic apparatus	2,349	1,542
Volt and ammeters	1,729	779
United Kingdom	349	104
West Germany	670	119
United States	219	23
Other instruments, n.e.s.	6,405	12,794
United Kingdom	760	869
West Germany	2,647	3,098
United States	1,641	103
France	404	2,091
Household meters	4,599	301
Belgium/Luxembourg	104	18
West Germany	1,586	24
Switzerland	2,815	44
Insulators	3,333	446
Installation material	18,046	1,683
United Kingdom	702	68
Belgium/Luxembourg	2,589	332
West Germany	12,086	208
Cables, lead covered	15,972	n.a.
United Kingdom	1,319	n.a.
West Germany	9,330	n.a.
Belgium/Luxembourg	4,790	n.a.
Wires and cables with rubber or plastic covering	22,134	n.a.
United Kingdom	1,371	n.a.
Belgium/Luxembourg	11,389	n.a.
West Germany	8,743	n.a.
Batteries, dry	3,226	542
United Kingdom	1,494	—
West Germany	1,005	—
Accumulators	7,919	3,020
Sweden	2,193	639
Belgium/Luxembourg	1,424	1,515
France	2,413	36
Lamps	25,851	55,091
United Kingdom	935	n.a.
Belgium/Luxembourg	21,075	n.a.
West Germany	1,924	n.a.
X-ray tubes	754	4,164
Other electro-medical lamps and appliances	8,380	n.a.
United Kingdom	1,913	n.a.
West Germany	3,350	n.a.
Italy	1,140	n.a.
Radio valves	50,951	119,486
United Kingdom	9,956	n.a.
Belgium/Luxembourg	18,217	n.a.
France	5,695	n.a.
West Germany	9,738	n.a.
Austria	2,512	n.a.
United States	2,480	n.a.
Radio receivers & parts, n.e.s.	145,136	205,283
United Kingdom	2,897	n.a.
Belgium/Luxembourg	79,962	n.a.
West Germany	56,209	n.a.
Switzerland	2,360	n.a.
Amplifiers	4,219	5,969
United Kingdom	955	n.a.
Belgium/Luxembourg	1,709	n.a.
West Germany	1,006	n.a.
Transistors	3,138	10,006
United Kingdom	483	n.a.
France	1,536	n.a.
United States	600	n.a.
Telegraph equipment	2,488	667
Telephone equipment	38,559	15,189
United Kingdom	1,361	109
Belgium/Luxembourg	16,753	933
West Germany	3,636	541
Sweden	10,127	768
Switzerland	3,963	557
Denmark	—	2,439
Loudspeakers, microphones and parts thereof	5,399	5,688
United Kingdom	269	125
Belgium/Luxembourg	2,446	624
West Germany	1,646	352
Other radio and telecommunication equipment and parts, n.e.s.	11,527	1,806
United Kingdom	2,631	n.a.
Belgium/Luxembourg	2,725	n.a.
West Germany	3,656	n.a.
United States	1,761	n.a.

n.a. = not available.

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

CONTRACTS OPEN

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses

Australia.—Western Australian Government Tender Board, Perth. 5th June. Transformers ranging from 25 kVA to 750 kVA. (E.S.B. 12027/58. Ten/32409.)*

State Electricity Commission of Victoria, Melbourne. 23rd July. 220 kV switchgear and accessories. (E.S.B. 12029/58. Ten/32416.)*

Blackburn.—Corporation. 14th June. Street lighting equipment. (See this issue.)

Canada.—Manitoba Hydro-Electric Board, Winnipeg. 19th June. Transformers for Kelsey power station. (E.S.B. 12355/58. Ten/32420.)*

Greece. — State Procurement Service, Athens. 28th May. F.m. link system. (E.S.B. 12210/58. Ten/32433.)* 30th May. Radio transmitters. (E.S.B. 12185/58. Ten/32432.)*

India.—Directorate General of Supplies and Disposals, New Delhi. 24th July. One 34,100 h.p. Kaplan water turbine and one 27,000 kVA generator. (E.S.B. 12282/58. Ten/32457.)*

Neyveli Lignite Corporation (P.), Ltd. 12th June. Six 1,000 kW diesel generating sets. (E.S.B. 12285/58. Ten/32424.)*

Kendal.—Borough Council. 9th June. Two electrically operated pumping sets. J. J. Lefevre, water engineer, Municipal Offices, Lowther Street.

Lebanon.—Beirut Municipality. 29th May. Underground cable for public electric lighting system. (E.S.B. 11994/58. Ten/32379.)*

Lewes.—Borough Council. 31st May. Pumps, motors, sterilising equipment, etc., for open-air swimming pool. C. T. Butler, borough engineer, Town Hall, Fisher Street.

Meltham.—U.D.C. 16th June. Two recirculation pump sets and one humus sludge pump set, complete with starters, wiring, etc. Arnold Brooksbank & Son, consulting engineers, 48, Sunbridge Road, Bradford, 1.

New Zealand.—G.P.O., Wellington. 16th June. Bells. (E.S.B. 12293/58. Ten/32408.)* 17th June. Switchboard lamps. (E.S.B. 12294/58. Ten/32407.)* 19th June. Capacitors. (E.S.B. 12292/58. Ten/32406.)*

Pakistan.—Department of Supply and Development, Karachi. Two 50 kW diesel generating sets. (E.S.B. 12660/58.I.C.A. Ten/32451.)*

Philippines.—National Economic Council, Manila. 2nd June. Radio transmitters and receivers, etc. (E.S.B. 12462/58. Ten/32475.)*

Rhodesia and Nyasaland.—Federal Tender Board, Causeway. 6th June. Telegraphic time recorders. (E.S.B. 12246/58. Ten/32404.)* Steel tubular telephone poles. (E.S.B. 12245/58. Ten/32431.)*

Salisbury Electricity Department. 24th June. Transformers, switchgear and control panels. (E.S.B. 11866/58. Ten/32358.)*

South Africa.—Union Tender and Supplies Board, Pretoria. 29th May. Electronic valves. (E.S.B. 11810/58. Ten/32355.)* 5th June. Portable telegraph distortion measuring sets, audio frequency amplifier and oscillator and tuned detector amplifier. (E.S.B. 11862/58. Ten/32374.)* Wide band measuring oscilloscope and audio frequency filters. (E.S.B. 11861/58. Ten/32375.)*

* Specifications may be inspected at the Export Services Branch, Board of Trade, Lacon House, Theobald's Road, London, W.C.1 (Chancery 4411; extension 769).

Lamp and switchboard jacks, switchboard keys and connecting strip. (E.S.B. 12601/58. Ten/32464.)* 12th June. 11 kV mercury arc rectifier. (E.S.B. 11802/58. Ten/32344.)* 17th July. Carrier receiver and generating equipment. (E.S.B. 11863/58. Ten/32351.)*

Cape of Good Hope Provincial Administration. Two refrigerators for blood storage purposes. (E.S.B. 12127/58. Ten/32405.)*

Stores Department, South African Railways, Johannesburg. 30th May. Electric goods lift. (E.S.B. 12573/58. Ten/32459.)*

Stanley.—U.D.C. 2nd June. Street lighting equipment. (See this issue.)

Stirling.—County Council. Trunk road lighting equipment. (See this issue.)

Wandsworth.—Borough Council. 4th June. V.h.f. radio telephone equipment. (See this issue.)

Warrington.—Borough Council. 23rd June. One electrically driven rotary tumbler washing machine and one electrically driven end-loading washing machine for Whitecross Homes. J. Y. Hughes, borough engineer, Town Hall.

ORDERS PLACED

Boldon.—U.D.C. Main road lighting in parts of the town (£6,010).—Revo Electric Co.

Glasgow.—British Railways (Scottish Region). Nine one-ton electrically operated hoist blocks, Motherwell long rail welding installation.—Clayton Crane & Hoist Co. Automatic train control, Edinburgh Waverley to Glasgow Queen Street.—Westinghouse Brake & Signal Co.

Newcastle-on-Tyne.—Regional Hospital Board. Electrical work in connection with two extension schemes being carried out at Prudhoe and Monkton Hospital (£23,785).—James Scott & Co.

WORK IN PROSPECT

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors

Aberdeen.—Houses at Kincorth and Mastrick (67); city architect, 11, Broad Street.

Aylesbury.—Over 300 dwellings, shops and other buildings as development of estate at Quarrendon; borough engineer, Friarscroft, 3, Oxford Road.

Bathgate.—County technical college for West Lothian C.C.; J. Calder, county clerk, County Buildings, Linlithgow.

Billericay.—Sunnymede County Junior School (£40,000); county architect, County Hall, Chelmsford.

Birkenhead.—Houses at Woodchurch (300), Grosvenor Street (70), Oxton Road (64), Mersey Mount (36) and Farlow Road (10); borough architect, 3, Conway Street.

Houses (77), Arrowe Park Road; Lloyd & Cross, Ltd., builders, Port Causeway, Bromborough.

Bishop Auckland.—Proposed technical college for Durham C.C. (£357,000); Crudens, Ltd., contractors, Musselburgh, Midlothian.

Bletchley.—Erection of Rickley County Junior School (£58,285); county architect, County Offices, Walton Street, Aylesbury.

Bournemouth.—Hostel for infirm persons, Throop Road (£73,450); Geo. Jenkins & Sons (Winton), Ltd., builders, 119, Alma Road.

Brampton.—Houses (105) for Ministry of Works; John Laing & Sons, builders, Dalston Road, Carlisle.

Bristol.—Store, Penn Street, for C. & A. Modes, Ltd., Oxford Street, W.1; Wm. Cowlin & Sons, Ltd., builders, Stratton Street.

Chelmsford.—Westlands County Junior School (£42,500); H. Conolly, county architect, County Hall, Chelmsford.

Cumberland.—New schools at Aspatria, Egremont and Longtown, and additions to St. Joseph's R.C. Secondary School, Workington; county architect, Portland Square, Carlisle.

Dudley.—Works extensions; Staffordshire Edge Tools, Ltd., New King Street.

Dwellings (220), Langley Farm estate; Wates, Ltd., 1258, London Road, S.W.16.

Old people's home, Dudley Wood Road; F. H. Gibbons, borough engineer, Council House.

Harlow.—Factory, Tye Green; Hosking & Son, Ltd., builders, Arterial Road, Rayleigh.

Holmes Chapel.—Kitchen, dining room, laundry, patients' villa, etc., at Cranage Hall Mental Deficiency Hospital, for Manchester Regional Hospital Board; Cruickshank & Seward, architects, 196, Deansgate, Manchester, 3.

Hull.—Cold stores, workshops, offices, Havelock Street; Kingston Deep Sea, Ltd., The Docks, Hull.

Ilkeston.—Dwellings (40), Kirk Hallam; borough surveyor.

Kingston-on-Thames.—Modernisation of main block of General Hospital; Gordon Jeeves, architects, 61, Catherine Place, London, S.W.1.

Leven.—Three-storey business premises; E. Woodbourne, company architect, F. W. Woolworth & Co., Ltd., 1, New Bond Street, London, W.1.

London.—Maudsley Hospital extensions, Denmark Hill; Galbraith Bros., Ltd., builders, 61, Bartholomew Close, E.C.1.

Health occupation centre, Perry Rise, Catford; R. T. Roberts, Ltd., builders, 2, Devonshire Road, S.E.23.

Houses (47), Tunnel Avenue, Westcombe Hill and Annandale Road, Greenwich, four-storey flats, Coldbath Street, and two-storey blocks at rear of Cade Tyler House, Blackheath Hill; borough engineer, Greenwich High Road, S.E.10.

Manchester. — Underground car park, Market Place; city engineer.

Houses at Partington and Moston (180); director of housing, Town Hall, 2.

Newcastle-on-Tyne. — Nuclear research laboratory, Fossway, for C. A. Parsons & Co.; Sir Robert McAlpine & Sons, contractors, 81, Jesmond Road, Newcastle-on-Tyne.

Shops, flats and offices, Benton Road; W. Smelt, builder, 125, Westgate Road, Newcastle.

Houses (26), Cottenham Street; city architect, 18, Cloth Market, Newcastle.

Laboratories, etc., Osborne Road, for the Northumberland Tyneside River Board; Spence & Price, architects, 26, St. Mary's Place, Newcastle.

Houses (50), Wharrier Street; John Twiname, Ltd., builders, Brigham, Cumberland.

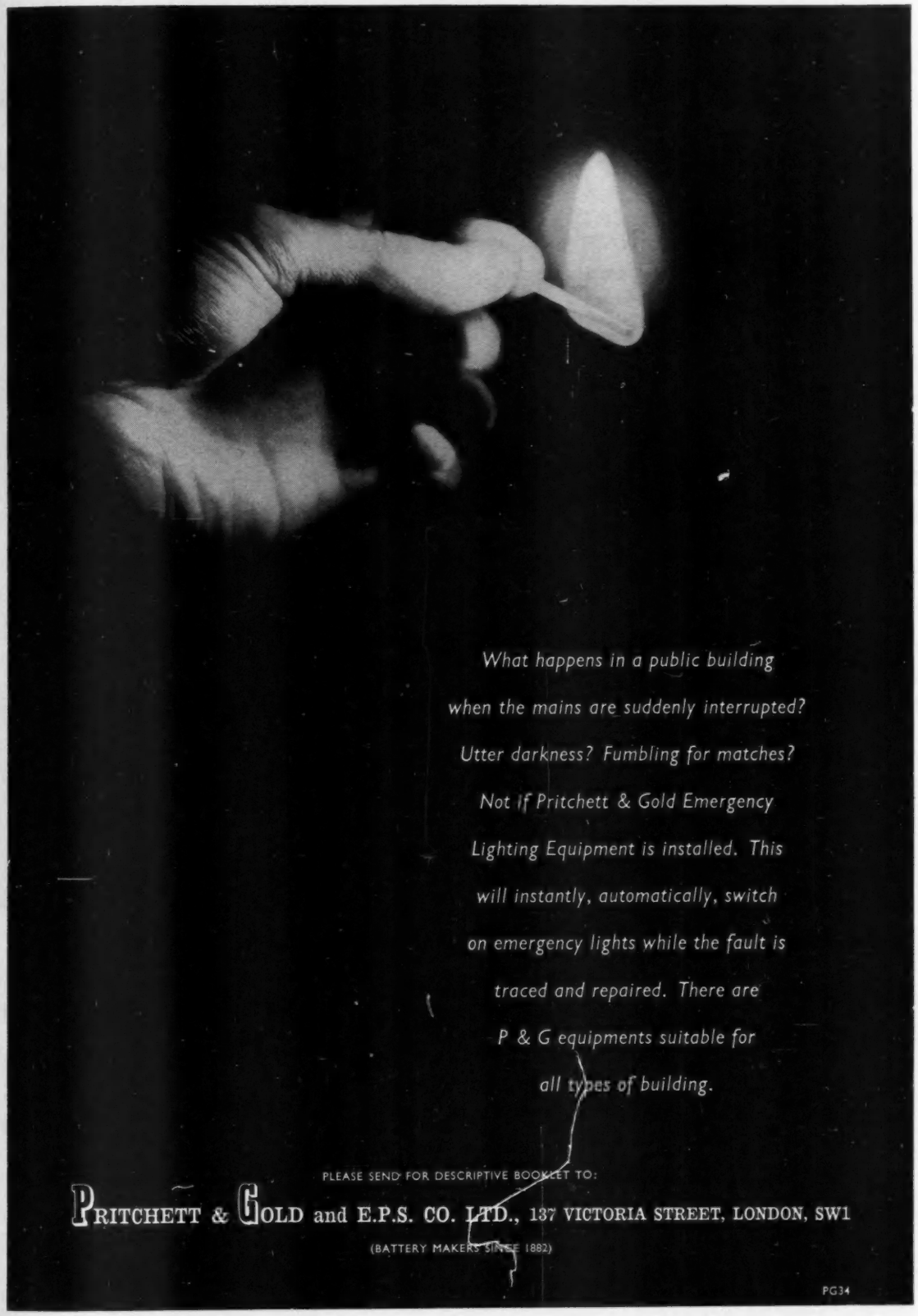
Ruislip.—Butter making factory on site off Victoria Road, South Ruislip; Express Dairy Co., Ltd., 15, Tavistock Place, W.C.1.

Smethwick.—Works extensions; British Cycle Corporation, Ltd., Cornwall Road.

Sunderland. — Additions to Technical College (first stage) (£420,000); borough architect, Grange House, Stockton Road.

Worthing.—Methodist church, Offington Park; Graeme I. C. Highet, architect, 9, Quarry Street, Guildford.

Houses (44), Ringmer Road South; E. G. Townsend, town clerk, Town Hall.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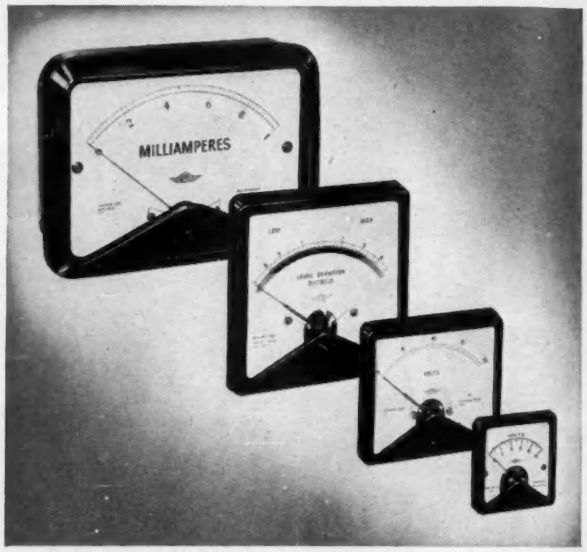

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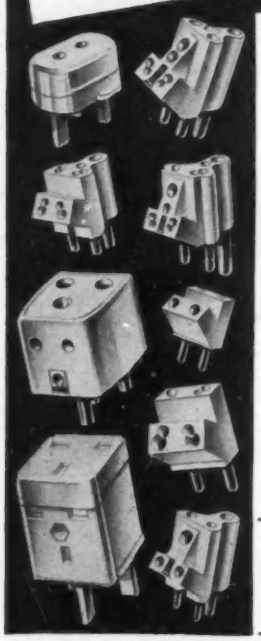

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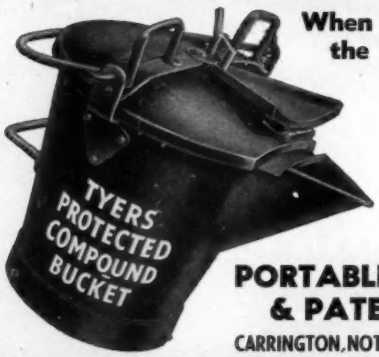

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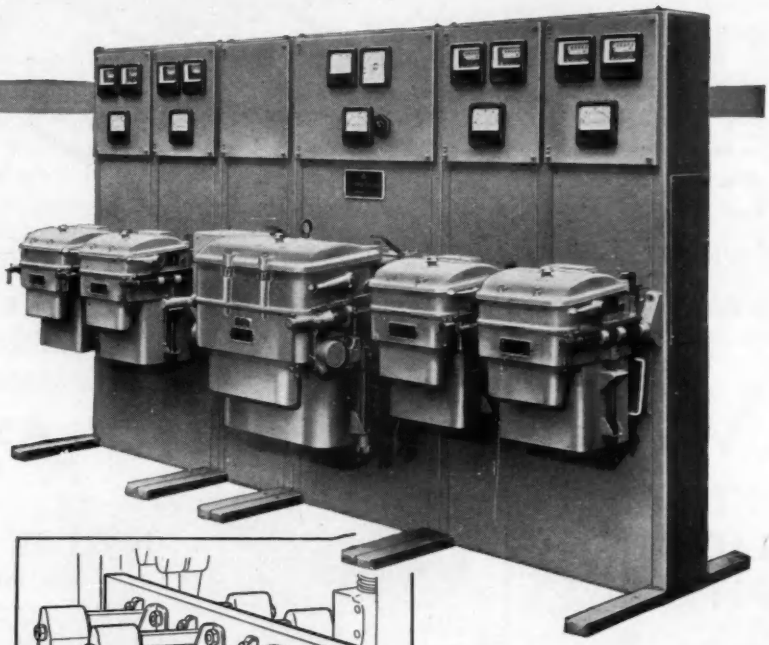

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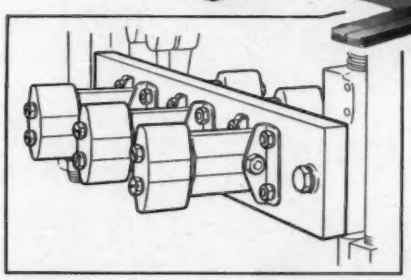

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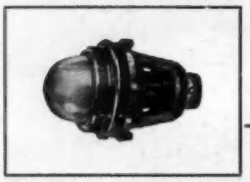

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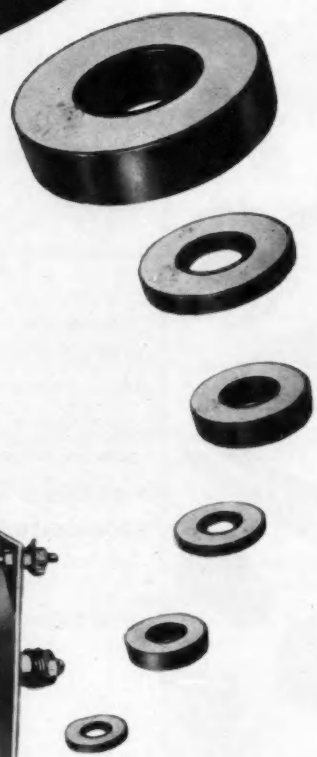

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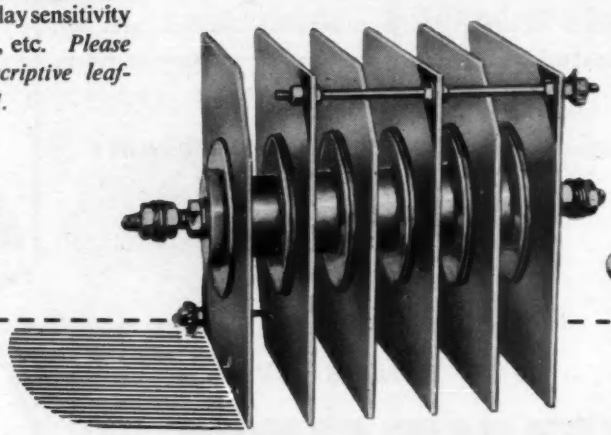

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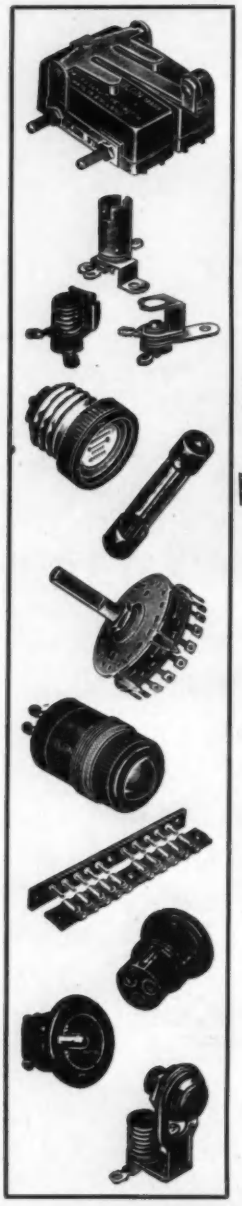

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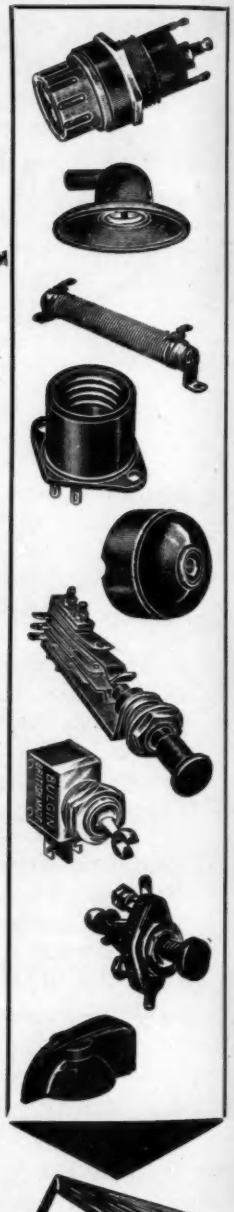

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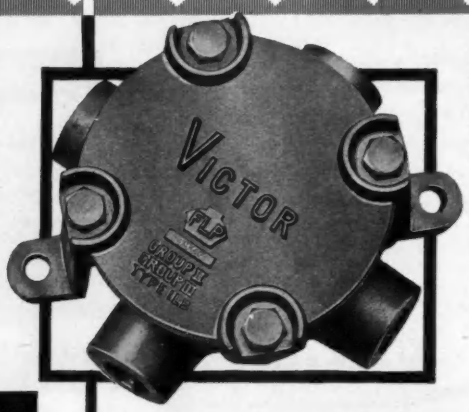

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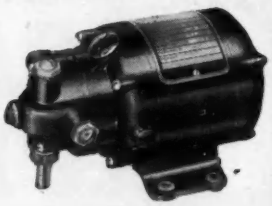

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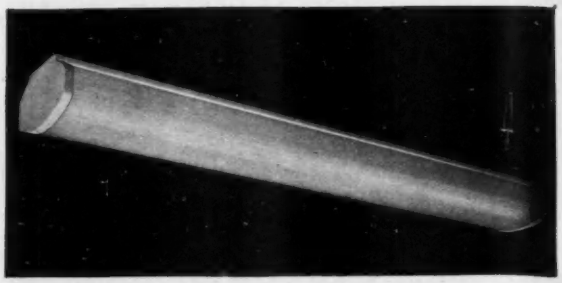

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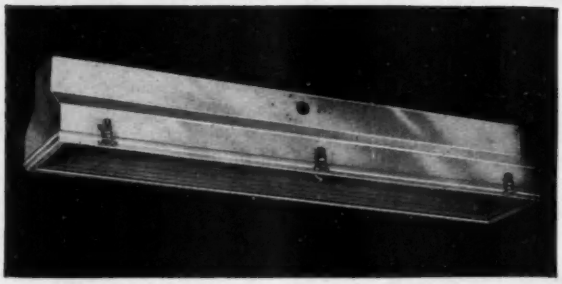

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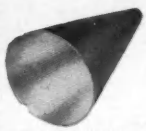

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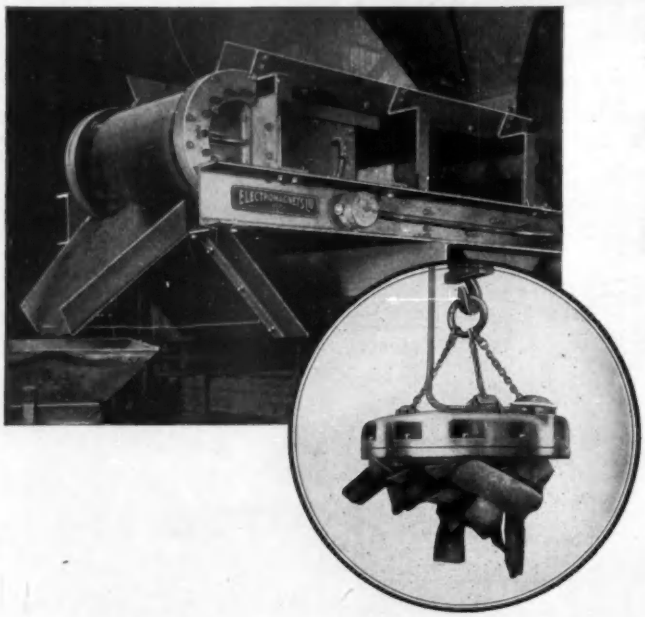

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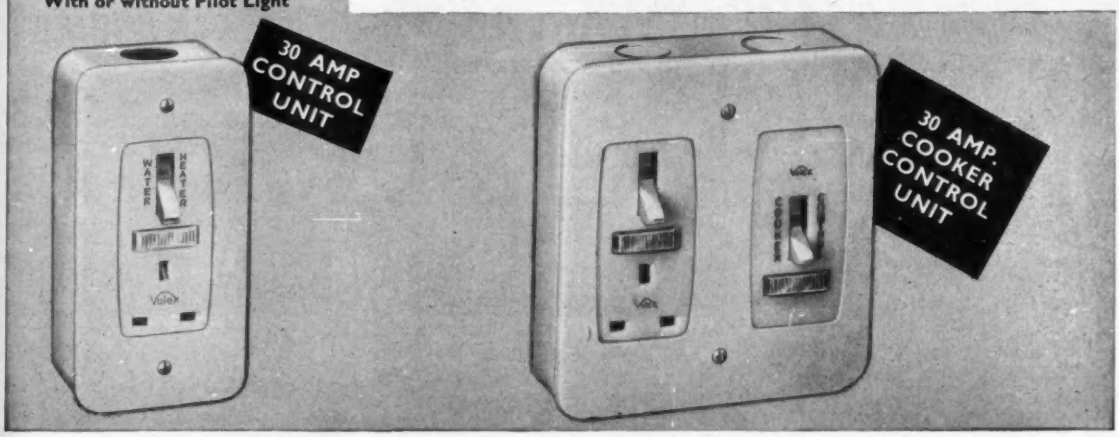

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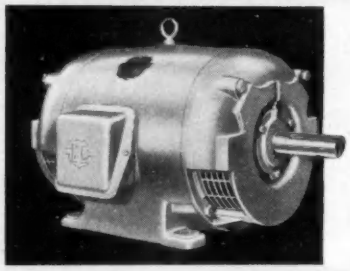

A.C. up to 50 h.p. to B.S.2960

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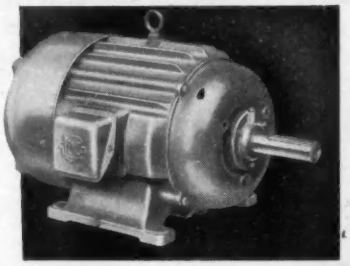

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Lists B.25 and B.35, giving full details of the above motors respectively will be sent on request.

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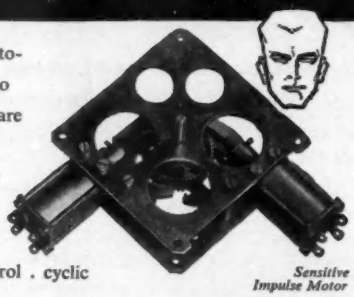

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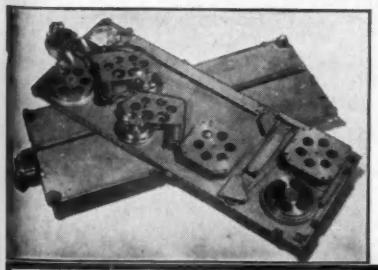

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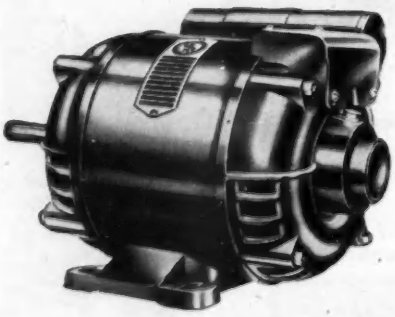

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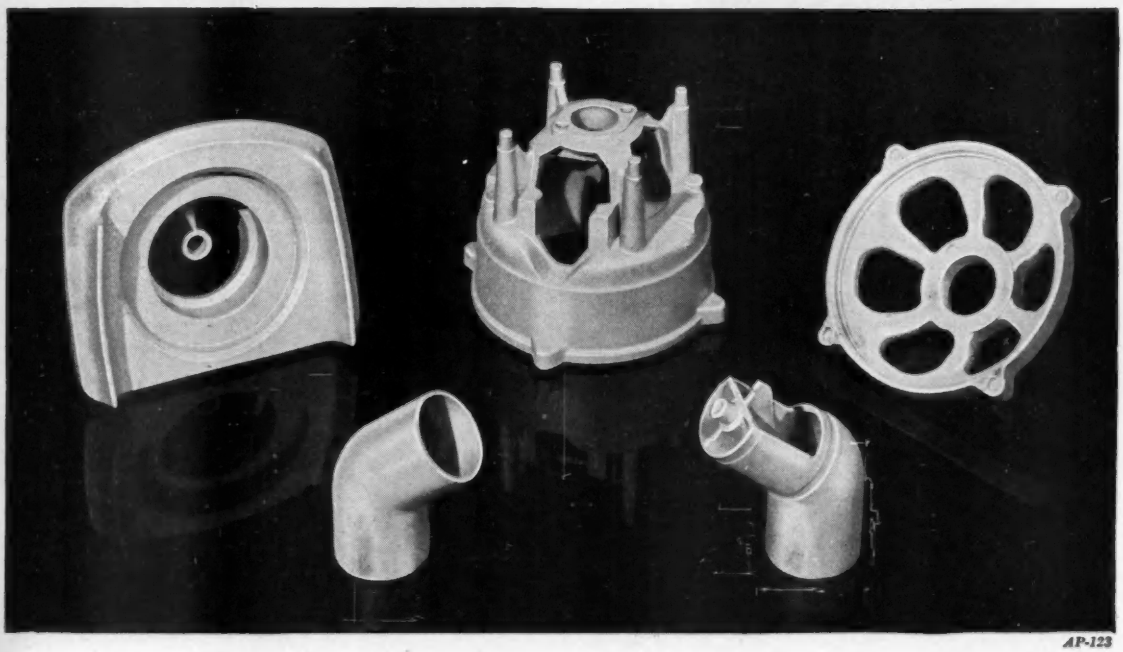

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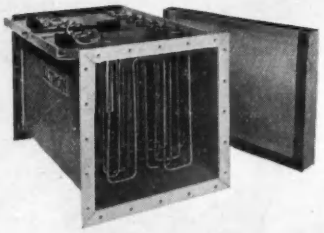

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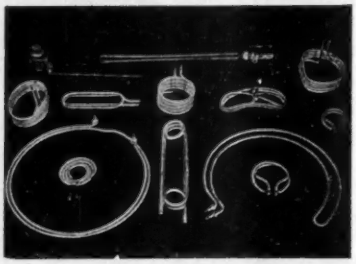

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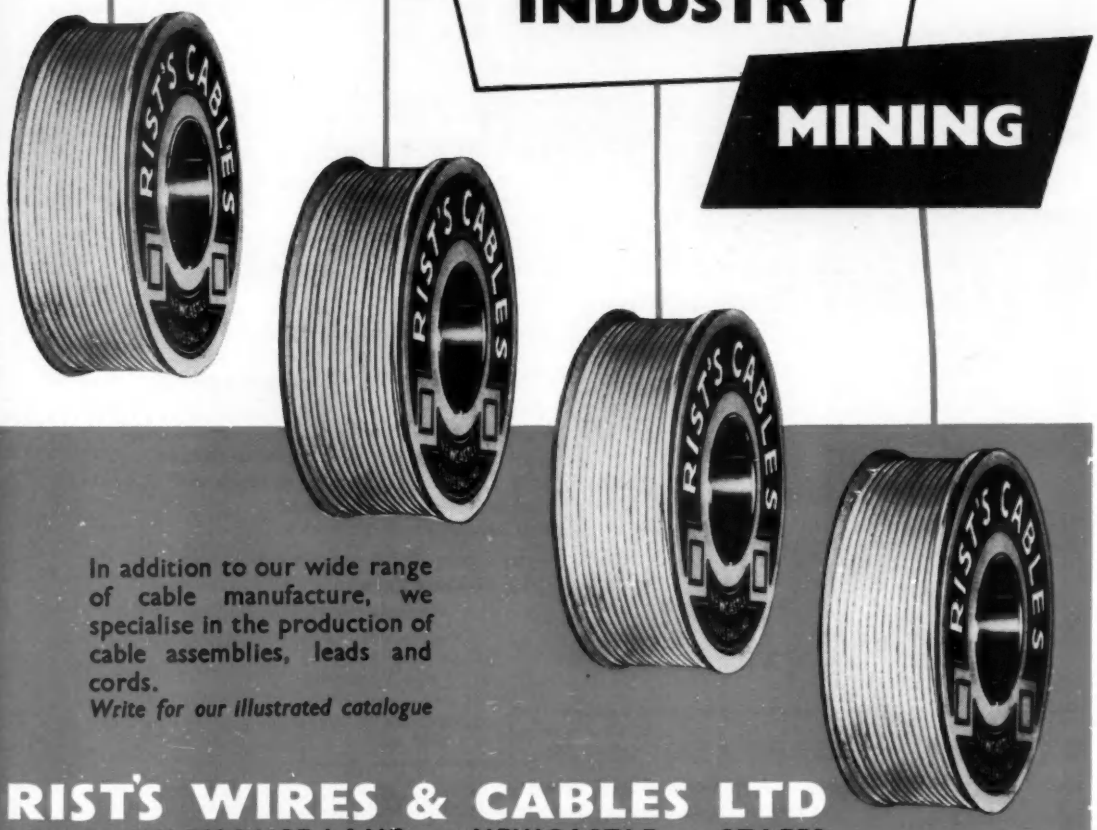

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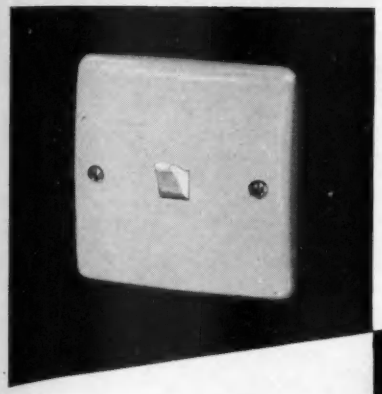

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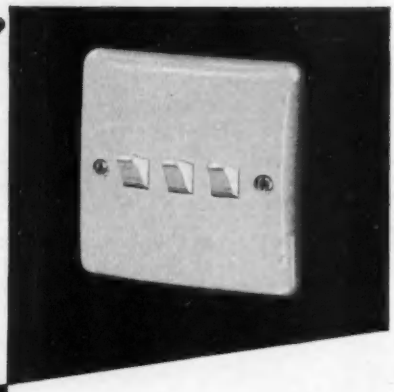

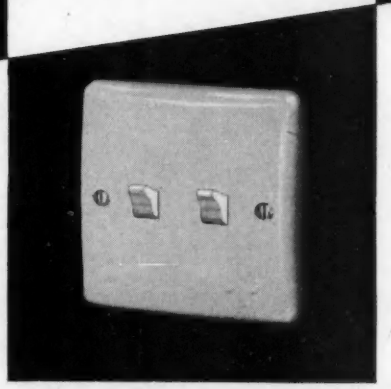

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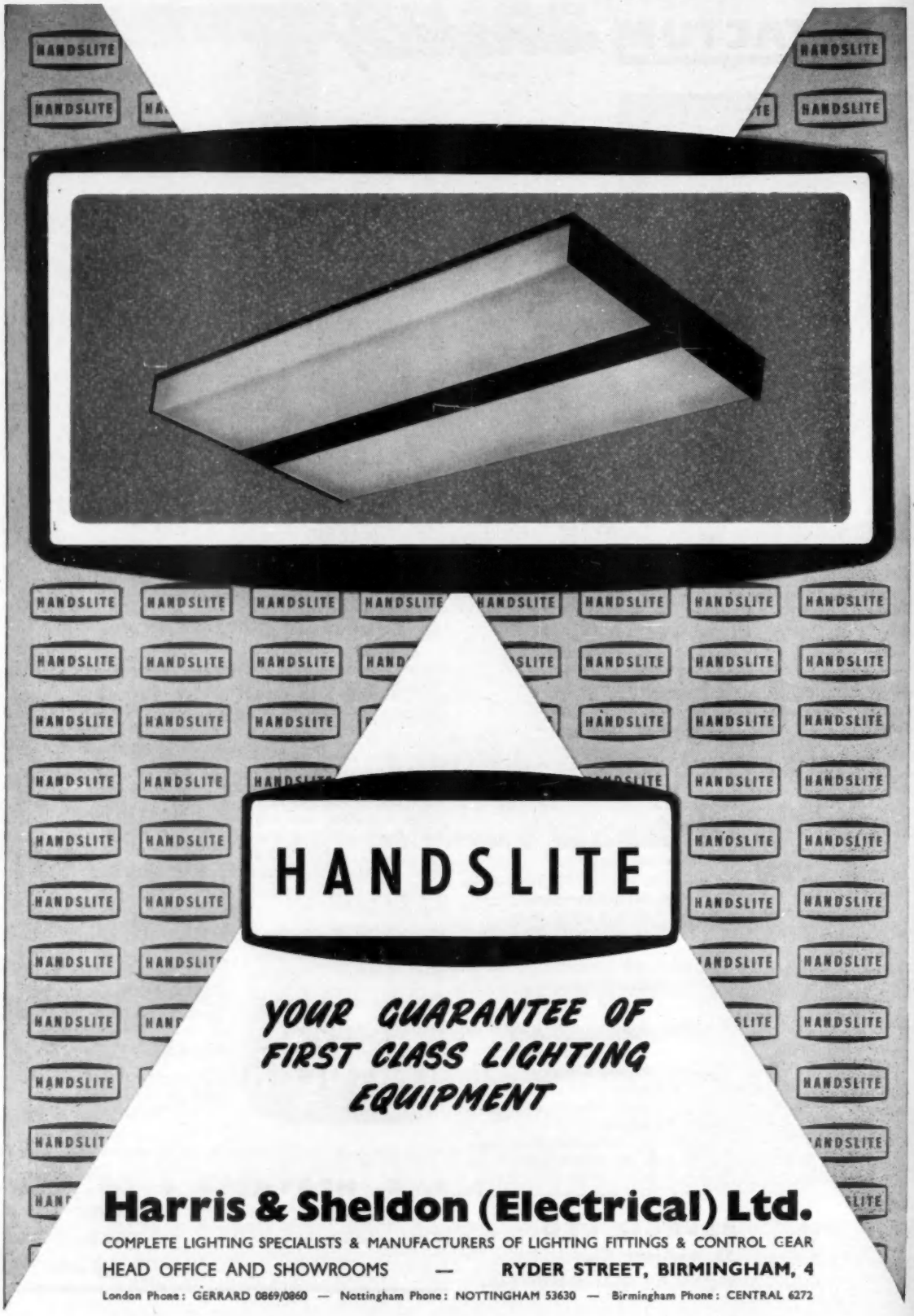
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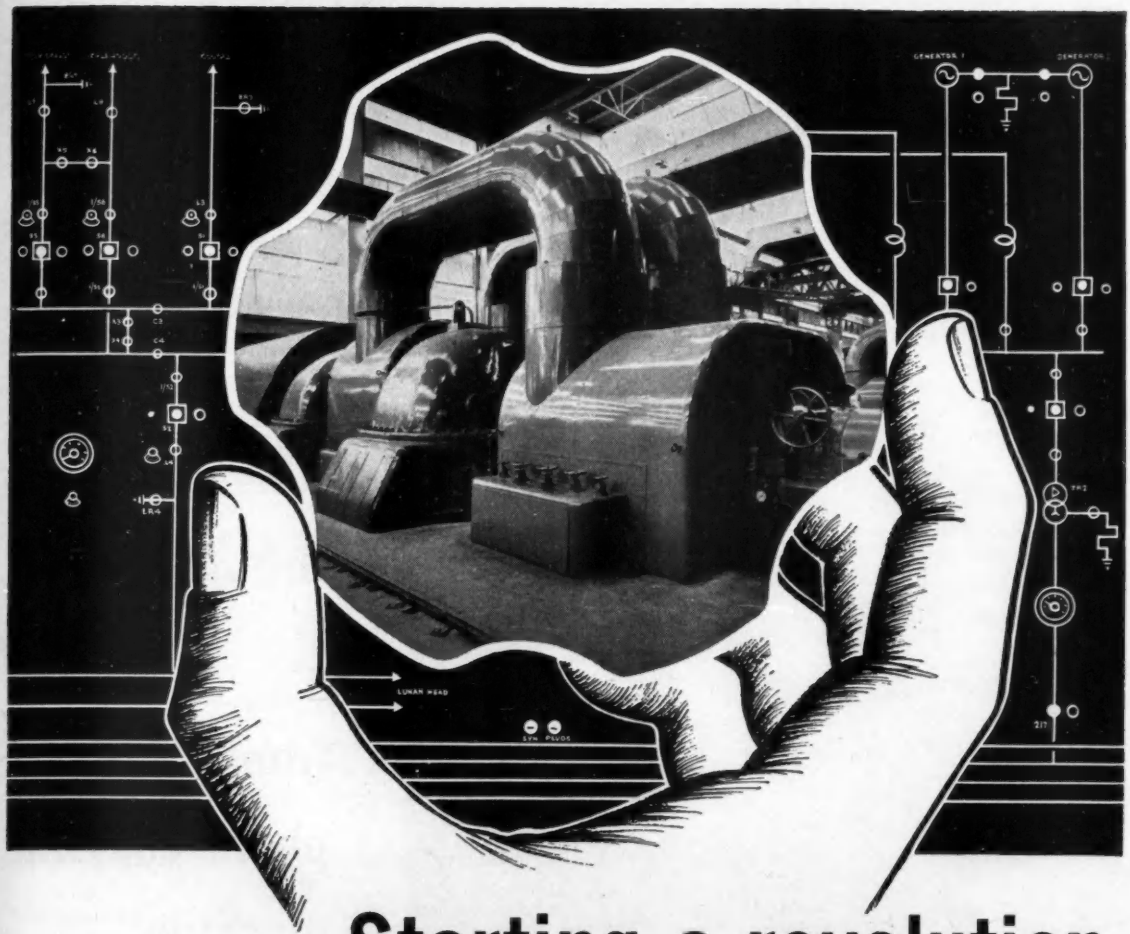

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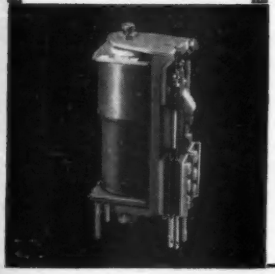

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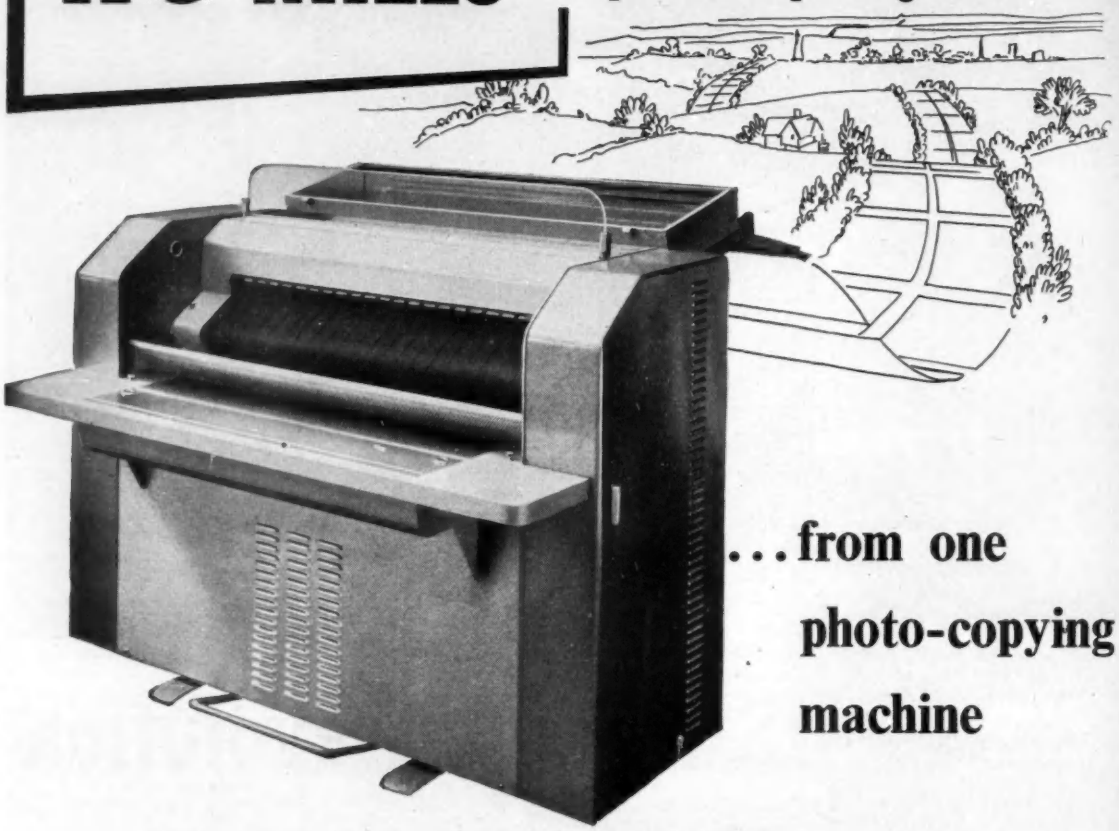

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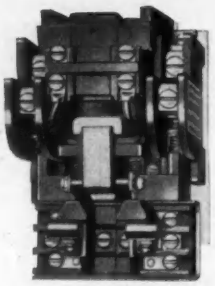

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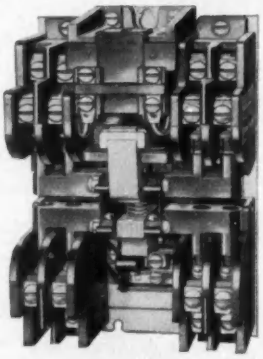

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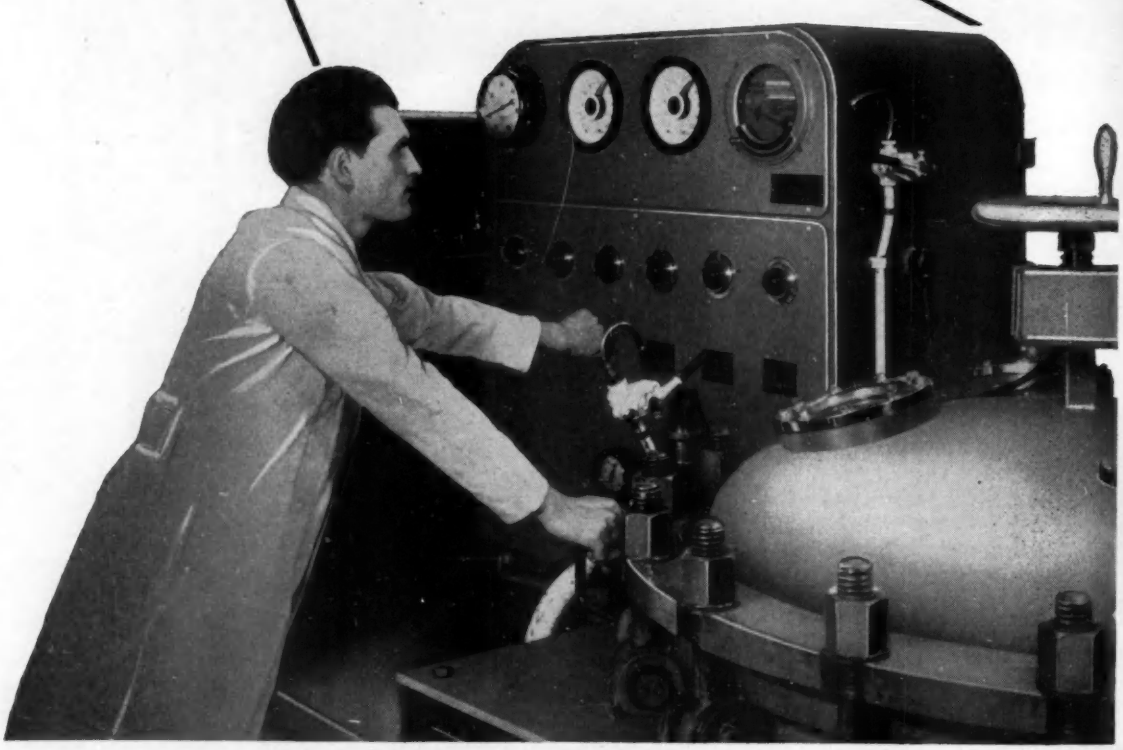

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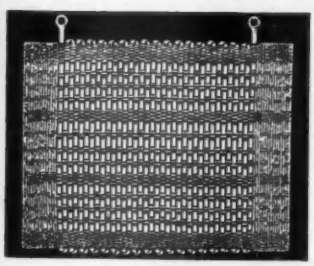

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to fit B.S. conduit sizes i.e. in trade terms	1, 2 & 3 ½" to ¾"	4 & 5 1" and 1¼"	6 & 7 1½" and 2"	8, 9 & 10 2¼" to 3½"

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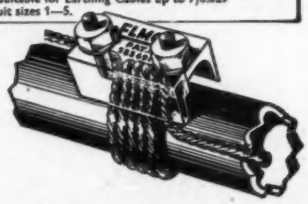

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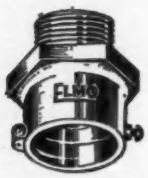

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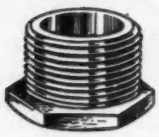

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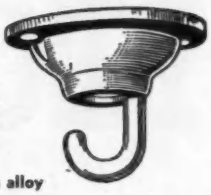

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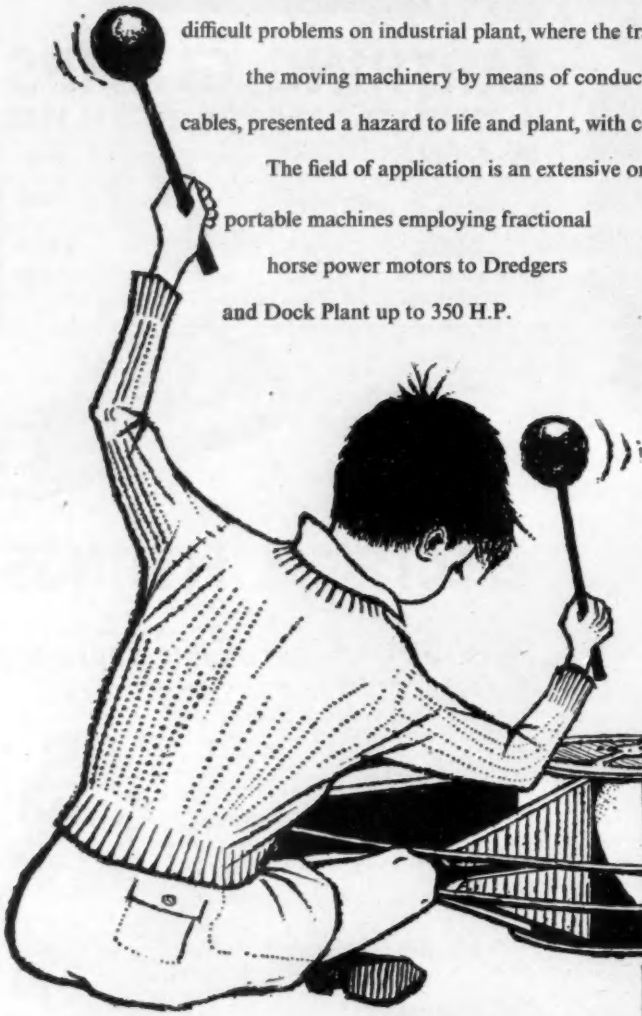

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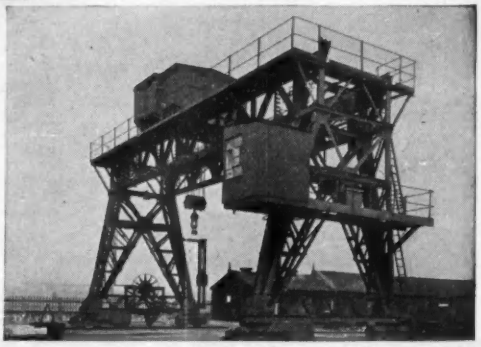

An illustration of a counter-weight operated radial reeling drum accommodating 130 feet of 4-core 1.3" overall diameter reinforced trailing cable for a 40-ton Goliath crane. (Photograph by kind permission of Messrs. Stothert & Pitt Ltd.)

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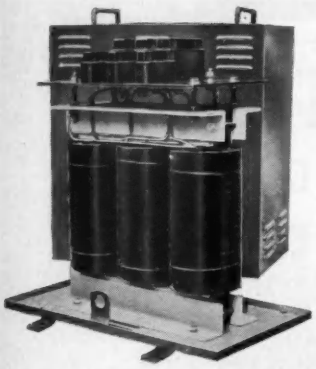

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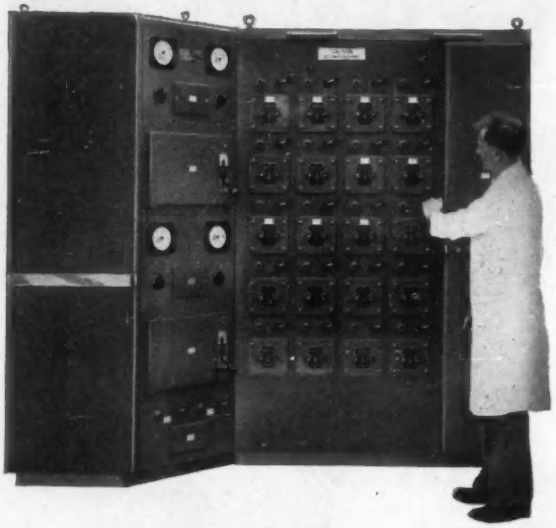

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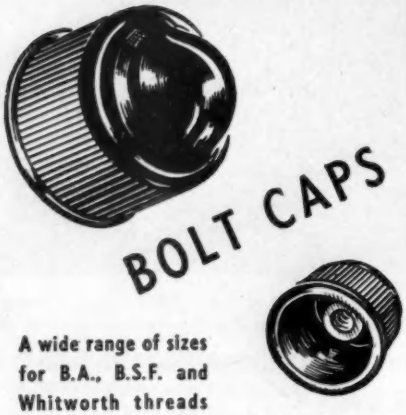

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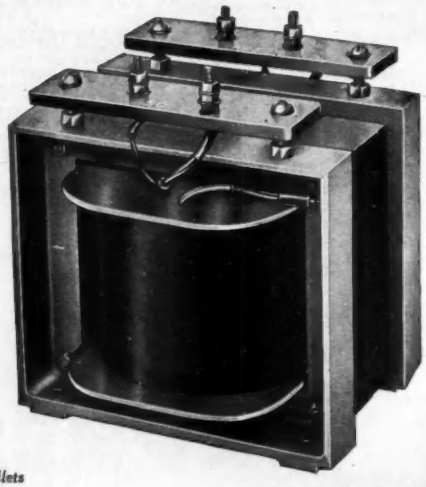

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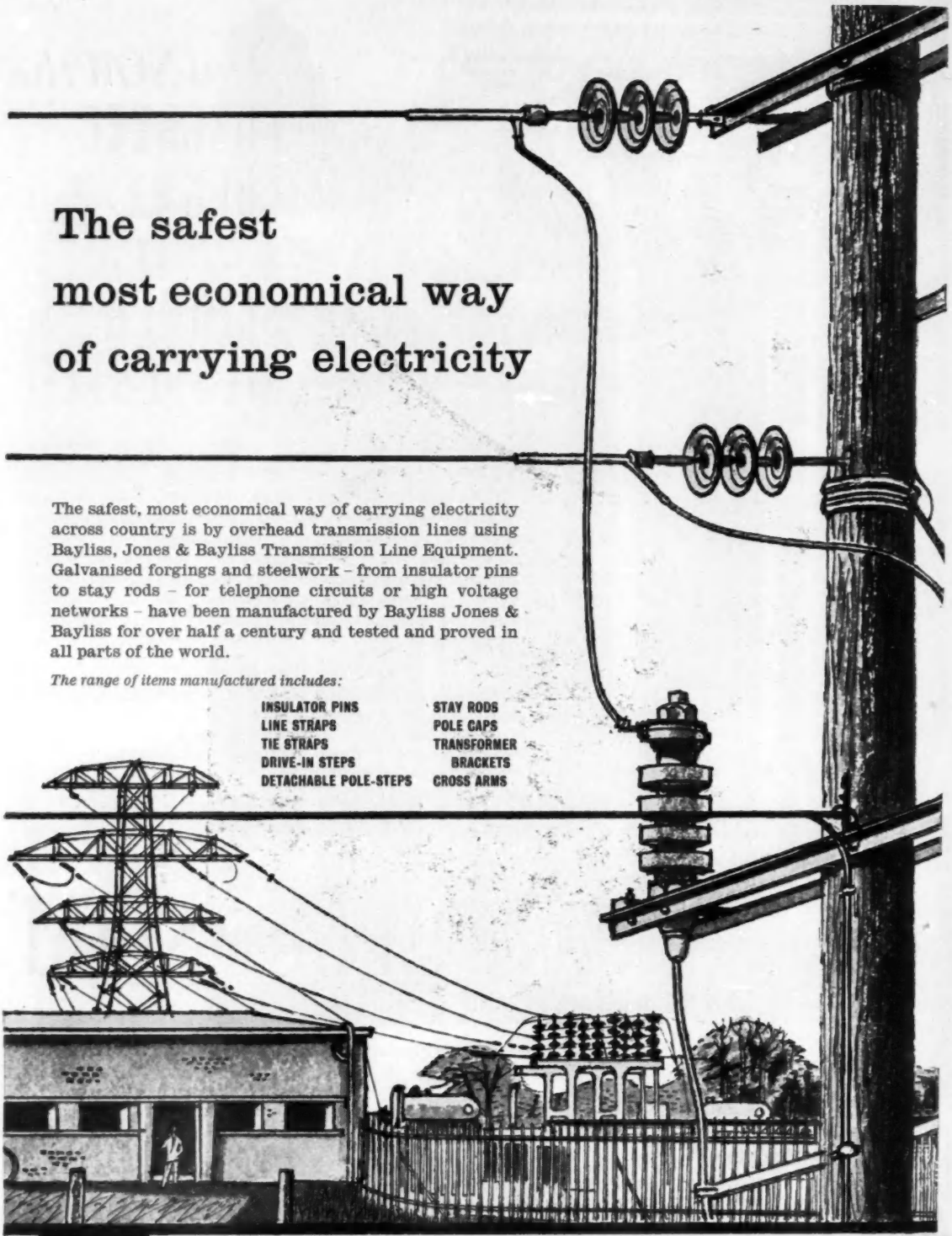

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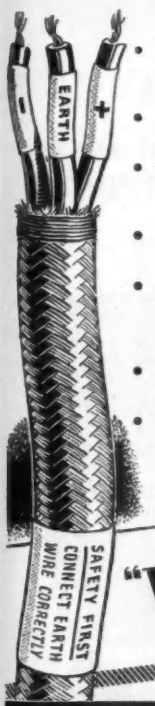

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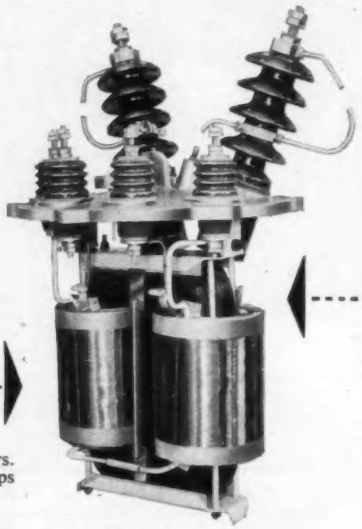
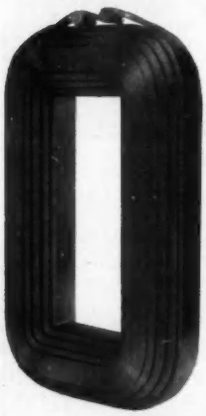


Typical Core & Coil Assembly

Illustration by courtesy of Messrs. Johnson & Phillips Ltd., London



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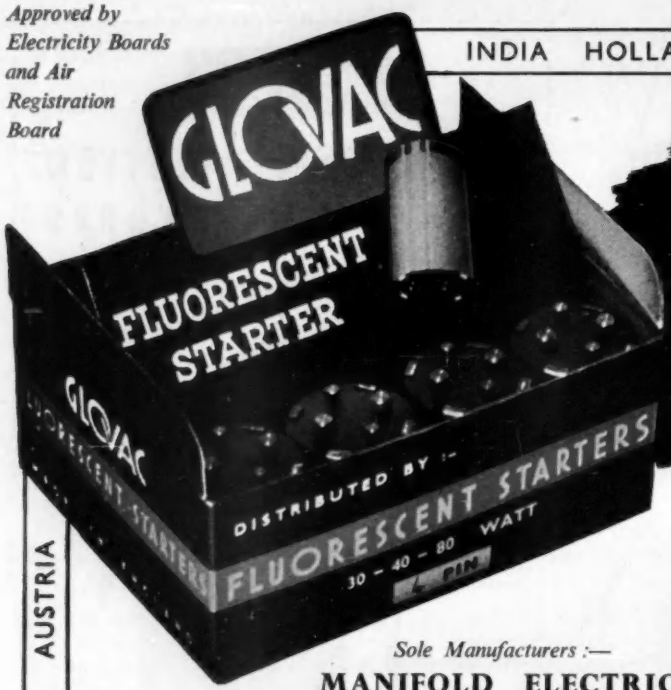

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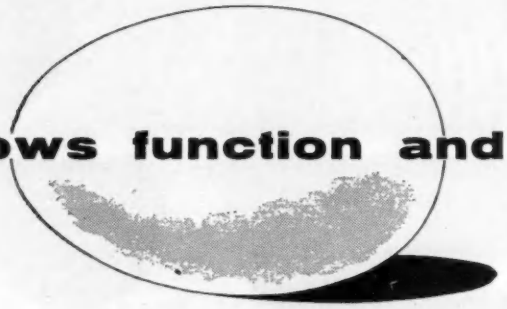

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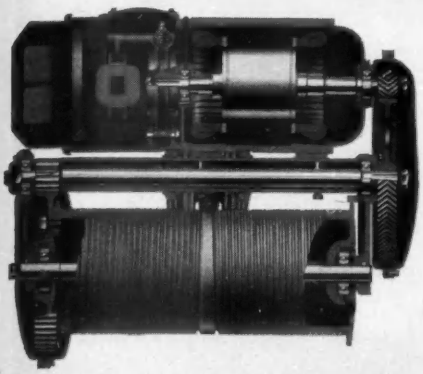

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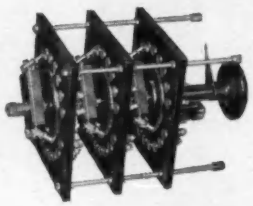

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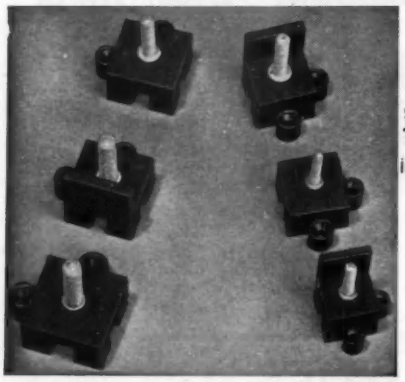

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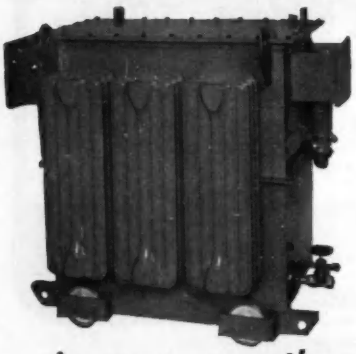

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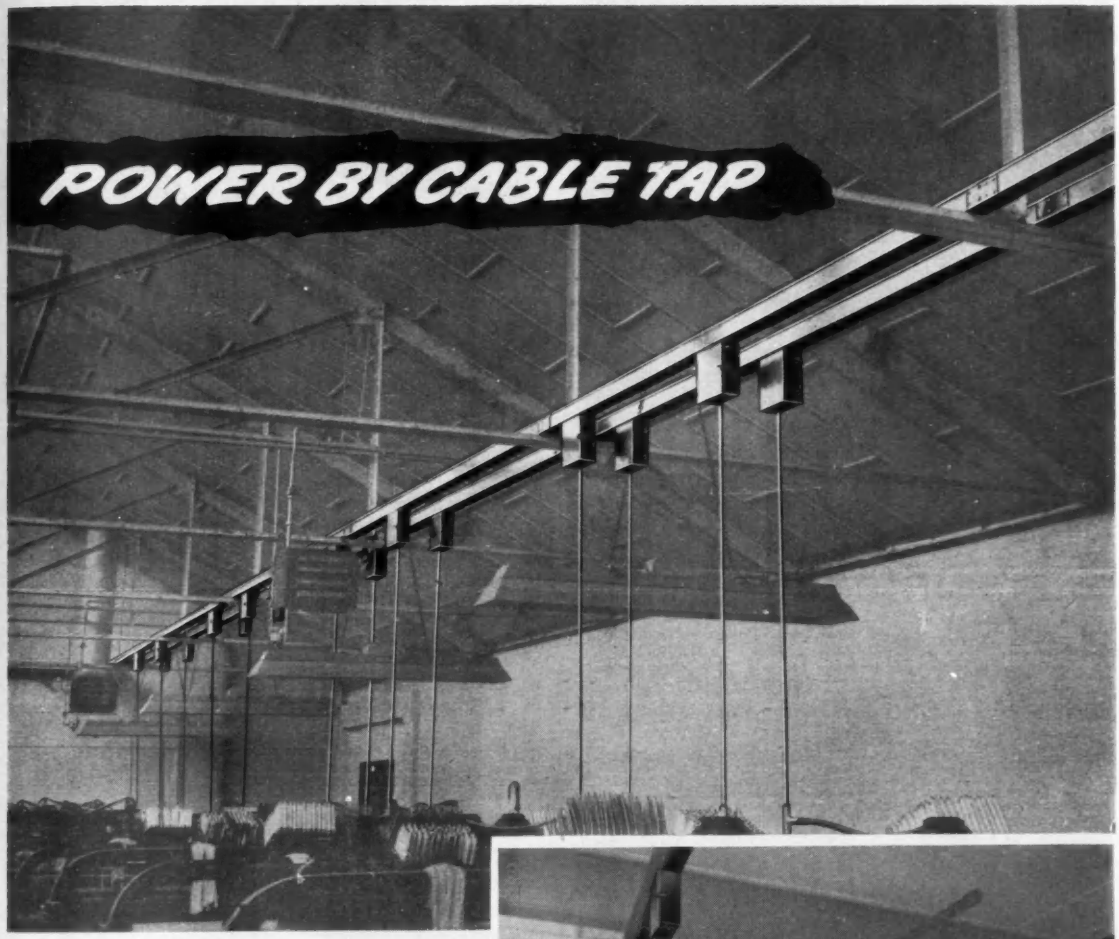

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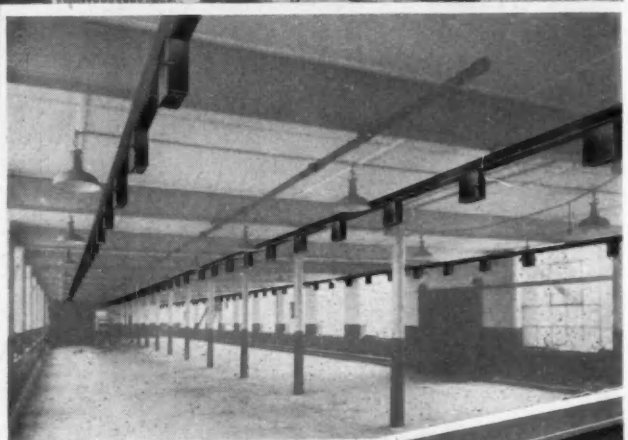

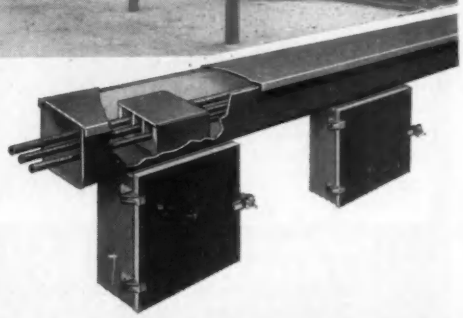

Photograph showing complete Cable Tap System prior to the Installation of Machinery

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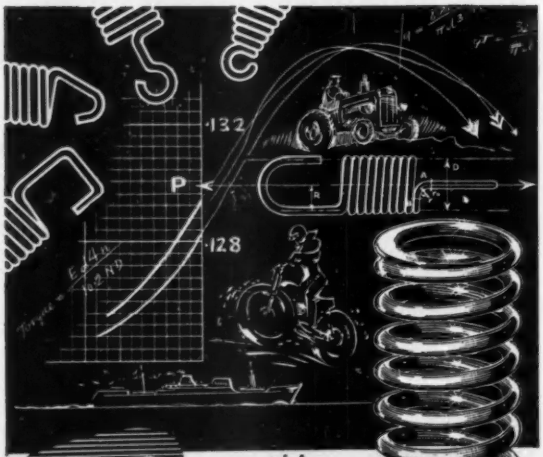

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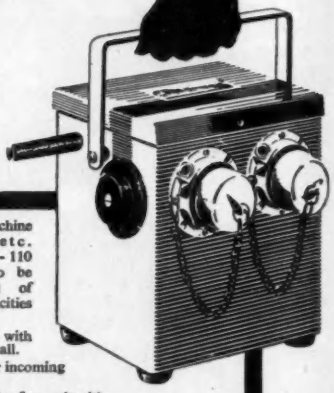

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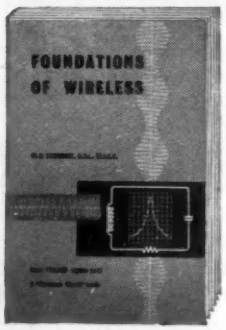

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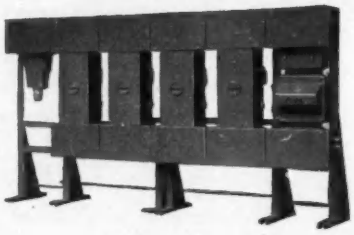
Fluvent Power Pillars—fully described in publication PP1, available on request.

ENERGY DISTRIBUTION FOR TODAY'S CONDITIONS

Energy Distribution for today's conditions demands fresh approaches. The examples illustrated are typical contributions by us to meet individual needs of widely different character.



Aeroflex Unit Type Switchboard, arranged so that any of the four outgoing circuits can be switched to either side of the busbars.

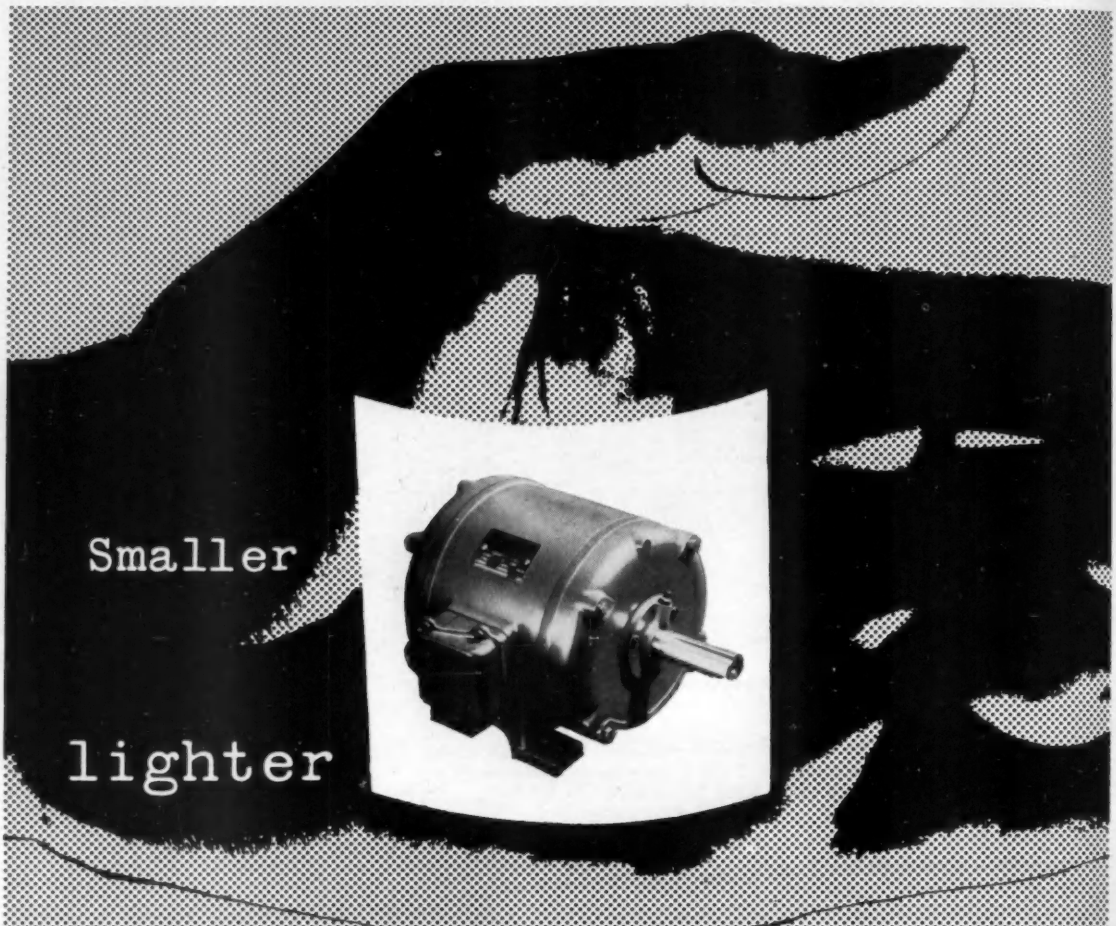
Parmiter Hope & Sugden Ltd

MANCHESTER 12

London: 34 Victoria Street, S.W.1. *Glasgow:* 5 Somerset Place, C.3 *Birmingham:* 39/41 Carrs Lane, 4

K

dm PH127



Series 5 motors are designed, electrically, to B.S. 2613: 1957, and take full advantage of class E insulation. In frame size and mechanical details they comply with B.S.2960: 1958.

They are generally about one frame size smaller and 40 per cent lighter than previous standard motors of the same horsepower. This means they cost less.

The enclosure is drip-proof and gives mechanical protection superior to that of earlier designs. Improved ventilation ensures that cooling air is drawn over the bearings at *both* ends and discharged centrally at low velocity.

Although entirely new in design, these motors benefit in countless details of manufacture by the long experience of . . .

Crompton Parkinson LIMITED

Member of the Nuclear Power Consortium:

ATOMIC POWER CONSTRUCTIONS LTD

MAKERS OF ELECTRIC MOTORS OF ALL KINDS · ALTERNATORS & GENERATORS · SWITCHGEAR · B.E.T. TRANSFORMERS CABLES · INSTRUMENTS · LAMPS · LIGHTING EQUIPMENT · BATTERIES · STUD WELDING EQUIPMENT TRACTION EQUIPMENT · CEILING FANS

ELECTRICAL EQUIPMENT

CROMPTON PARKINSON LTD., CROMPTON HOUSE, ALDWYCH, LONDON, W.C.2

Classified Advertisements

CLASSIFIED advertisements are PREPAID at 3/6 per line (approx. 6 words) per insertion. Where an advertisement includes a Box Number there is an additional charge of 1/-.

DISPLAYED CLASSIFIED:—48/- per inch. Cheques and Postal Orders should be crossed and made payable to ELECTRICAL REVIEW PUBLICATIONS LTD.

SERIES DISCOUNTS for consecutive insertions:—13, 5%; 26, 10%; 52, 15%.

SITUATIONS WANTED:—Three insertions under this heading can be obtained for the price of two if ordered and prepaid with the first insertion.

REPLIES to Box Numbers should be addressed to the Box Number in the advertisement, c/o ELECTRICAL REVIEW, Dorset House, Stamford Street, London, S.E.1, but if not to be delivered to any particular firm or individual they should be accompanied by instructions to this effect, addressed to the Manager of the ELECTRICAL REVIEW. Replies in such cases cannot be returned. The name of an advertiser using a Box Number will not be disclosed.

OFFICIAL NOTICES, TENDERS, ETC.

STANLEY URBAN DISTRICT COUNCIL

Group "A" Street Lighting, Aberford Road, A.642

TENDERS are invited for:—

(1) The supply of 97 Group A, 400-watt, high-pressure Mercury Vapour Lanterns, control gear and lamps, and

(b) The supply and erection of concrete columns and fittings and wiring of lighting equipment.

Specifications, bills of quantities, form of tender and full particulars may be obtained from Mr. J. Hustwit, Assoc.M.Inst.,C.E., Engineer and Surveyor, Council Offices, Coach Rd., Outwood, Nr. Wakefield, at whose office the contract documents and drawings may be inspected.

Sealed tenders, endorsed "Street Lighting, Aberford Road (A.642)," must be received by me not later than the first post, 2nd June, 1958.

The Council do not bind themselves to accept the lowest or any tender.

R. BLAKEY,
Clerk of the Council.
Council Offices,
Coach Road, Outwood,
Nr. Wakefield, Yorks. 3523

COUNTY COUNCIL OF THE COUNTY OF STIRLING

London-Edinburgh-Thurso Trunk Road, A.9

THE County Council propose to proceed with a new street lighting installation on the section of the Bridge of Allan road between Stirling and Bridge of Allan, a distance of approximately 495 yards.

The work includes the supply and erection of 13 Reinforced Concrete Lamp Columns, Brackets, Lanterns and Sodium Vapour Lamps.

Contractors desirous of tendering for the above work are requested to inform the undersigned within seven days from the date of publication of this advertisement.

JAMES D. KENNEDY,
County Clerk.
County Offices,
Viewforth, Stirling. 3547

COUNTY BOROUGH OF BLACKBURN

Street Lighting Materials, Accrington Road

TENDERS are invited for the supply of the whole or part of the following Class A lighting equipment:—

40 Concrete Columns, 25 ft. M.H., smooth ground, narrow base, spade root.

40 Lanterns of side entry pattern, 400 watt, HPMV.

40 Sets of Gear, solid filled type, 240-volt supply.

Specifications obtainable from the Borough Engineer, Town Hall, Blackburn, Lancs., and tenders should be sent to me by 14th June in plain envelope endorsed "Lighting."

FRANK SQUIRES,
Town Clerk. 3534

METROPOLITAN BOROUGH OF WANDSWORTH

V.H.F. Radio Telephone Equipment

TENDERS invited for supply, delivery and installation of nine additional Mobile Radio Telephone Transmitter/Receiver Sets.

Tender documents, obtainable from Borough Engineer, must reach me by 10 a.m., 4th June, 1958.

R. H. JERMAN,
Town Clerk. 3509

NORTHAMPTON COLLEGE OF ADVANCED TECHNOLOGY

St. John Street, London, E.C.1

ELECTRONIC COMPUTING

THE Mathematics Department of the College is equipped with a Ferranti PEGASUS Digital Computer and an Elliott G-Pac Analogue Computer.

These machines are available for technical and commercial calculations at agreed rates. The staff of the department will be glad to co-operate.

Enquiries should be addressed to the Head of the Mathematics Department at the College. 3533

SITUATIONS VACANT

DERBY AND DISTRICT COLLEGE OF TECHNOLOGY

Principal: T. Heap, Ph.D., M.Sc., F.R.I.C., A.M.I.I.A.

APPLICATIONS are invited for the post of SENIOR LECTURER in Electrical Engineering. Applicants, who should be University Graduates with considerable teaching and industrial experience, will be required to teach and assist in the organisation of sandwich courses and courses for Part III of the Institution of Electrical Engineers' examination.

Salary in accordance with the Burnham Scale for Senior Lecturers, men £1,350-£50-£1,550, women £1,080-£40-£1,240.

Application forms and details of the post may be obtained from the Principal, Derby and District College of Technology, Normanton Road, Derby, by whom completed applications should be received within two weeks of the appearance of this advertisement.

C. MIDDLETON,
Secretary to the Joint Committee. 3579

SALES ENGINEER

APPLICATIONS are invited for an experienced SALES ENGINEER based on Liverpool to cover the sales of industrial and commercial lighting equipment in the Merseyside, North Wales and Cheshire area.

Attractive salary is offered to applicant who has the required sales and technical experience. Car will be provided and opportunity will be given to the applicant to join the superannuation scheme.

Write in confidence giving full details of age, sales experience, education, training, etc., to the Area Manager, The Benjamin Electric Ltd., 5, Corporation Street, Birmingham, 2. 3501

METROPOLITAN BOROUGH OF BATTERSEA

APPLICATIONS are invited for the permanent appointment of ASSISTANT ENGINEER, A.P.T. Grade III (£845 to £1,025 per annum, plus London weighting, £30 per annum age 26 and over). The commencing salary will be related to experience and to any professional qualifications held.

The successful applicant will be engaged on general mechanical and electrical work.

The appointment is subject to the Local Government Superannuation Acts, 1937-53.

Further particulars and forms of application obtainable from the Borough Engineer and Surveyor, Town Hall, London, S.W.11. Closing date, 9th June. 3475

WHITSUN

ADVERTISEMENTS for the issue of 30th May have now closed for press

ADVERTISEMENTS are accepted up to **First Post on Monday** of the week of issue and should be addressed to ELECTRICAL REVIEW, Classified Advertisement Department, Dorset House, Stamford Street, London, S.E.1.

Original testimonials should not be sent with applications for employment

EAST MIDLANDS ELECTRICITY BOARD

Fourth Assistant District Engineer Lincoln District

APPLICATIONS are invited for an appointment as FOURTH ASSISTANT DISTRICT ENGINEER in the Lincoln District of the Lincolnshire Sub-Area.

Candidates should preferably possess a qualification of at least the Ordinary National Certificate in Electrical Engineering and have had some experience in the general work of a mains department.

The ability to drive a motor vehicle and the possession of a current driving licence would be an advantage.

Salary and conditions of the appointment will be in accordance with the National Joint Board Agreement, Class F, Grade 13 (£590 × £15 to £635 per annum).

Applications giving details of age, education, qualifications, present position and previous experience should be forwarded to The Manager, Lincoln District, Brayford Side North, Lincoln, so as to reach him within fourteen days of the issue of this advertisement. 3557

CENTRAL ELECTRICITY GENERATING BOARD

Midlands Division

THIRD ASSISTANT ENGINEER is required in the System Development Section of the Technical Department at Headquarters, Moseley, Birmingham. N.J.B. service conditions, superannuable appointment, salary within Schedule B, Grade 6, commencing at a point commensurate with qualifications and experience within the range £895-£1,020 per annum, ultimately rising to £1,140.

Applicants should possess qualifications equivalent to Graduate I.E.E. and should have had practical training either in the supply industry or with a switchgear manufacturer. They should also have held a position involving transmission system planning, and should have a sound knowledge of the calculations involved, and of the design and operation of such systems.

Apply, quoting Vacancy No. 802MD on form AE6 available from the Establishments Officer, 53, Wake Green Road, Moseley, Birmingham, 13, by 19th June, 1958. 3555

SENIOR AND JUNIOR ENGINEERS SENIOR AND JUNIOR DRAUGHTSMEN

VACANCIES exist in the Technical Department for engineers and draughtsmen capable of undertaking research, development, or project control in the fields of electrical energy metering, instrumentation, electronics, or light mechanism applications.

There is considerable scope for initiative in all fields, and generous salaries will be paid to applicants of experience, enterprise and imagination.

Apply to:—

The Technical Manager
ARON ELECTRICITY METER LTD.
72-82, Salusbury Road, London, N.W.6
3427

Situations Vacant (continued)

GHANA PUBLIC SERVICE COMMISSION

APPLICATIONS are invited for the following vacancies in the DEPARTMENT OF POSTS AND TELECOMMUNICATIONS:

ENGINEERS/ASST. ENGINEERS: Chargeship of Telecommunication Engineering District or Assistant to Engineer. Responsible for installation and satisfactory maintenance by subordinate staff of overhead and underground telegraph and telephone lines; telegraph apparatus including teleprinters, automatic and manual telephone exchanges, carrier telephone apparatus and V.H.F. telegraph, railway block signalling and control apparatus; transport, small petrol and diesel engine generators. Must possess a B.Sc. (Engineering) or other recognised engineering degree plus two years' practical experience, or have passed Parts I, II and III of the examination of the Institution of Electrical Engineers. Salary in range £1,080 - £2,080 a year.

RADIO ENGINEER/ASST. RADIO ENGINEER: Chargeship of Radio Engineering Division or Assistant to Engineer, responsible for the technical side of radio telecommunication, including the installation and maintenance of medium, H.F. and V.H.F. W/T and R/T stations operated by the Post Office, Police and Civil Aviation Departments and of associated power plants and supervision of subordinate staff. Candidates must possess a B.Sc. (Engineering) or other recognised engineering degree plus 2 years' practical experience, or must have passed Parts I and II of the examinations of the Institution of Electrical Engineers. Preference will be given to candidates who have had subsequent experience with a leading manufacturer or the British Post Office, including experience with H.F. and V.H.F., fixed and mobile equipment, and air and sea navigational aids. Salary in range £1,080-£2,080 a year.

Appointments are on contract for two tours each of 18-24 months duration. Gratuity at rate of £12 10s. for each completed month of residential service payable on completion of contract. Outfit allowance £30 - £60 on first appointment. Free first class passages for officer, wife and up to 3 children under 18 years, and in addition an education allowance for children when not resident in Ghana of £100 a child for up to 3 children under 18 years. Generous home leave on full pay. Income tax at low local rates. Preservation of superannuation or pension rights, where applicable, can be arranged.

For further particulars and application form write, stating age, qualifications and experience to THE DIRECTOR OF RECRUITMENT, GHANA HIGH COMMISSIONER'S OFFICE, 13, BELGRAVE SQUARE, LONDON, S.W.1. 3513

ELECTRICAL DESIGN AND DEVELOPMENT

Expansion provides opportunity for enthusiastic men technically qualified to H.N.C. standard or higher. Our immediate need is for:—

DESIGN ENGINEERS for work on control circuits; experience should include electronic and magnetic amplifier control of electrical rotating machines.

These appointments, and others which we expect to make shortly, offer both absorbing interest and satisfying reward.

If you believe you can qualify for a place in our specialist design team please reply now, including age and salary indication.

Confidential treatment ensured by addressing:—

Chief Electrical Designer,
VERNONS INDUSTRIES LTD.,
Kirkby Industrial Estate,
Liverpool.

3564

ELECTRICITY CORPORATION OF NIGERIA

APPLICATIONS are invited for the following appointments:—

SENIOR EXECUTIVE ENGINEERS

The duties of these appointments will consist mainly of the executive control and management of districts comprising a number of electricity undertakings with mainly overhead distribution networks and diesel engined power stations.

An intensive development programme is at present in progress, and in addition to wide experience in the above duties, applicants should also be capable of supervising construction of transmission lines up to 132 kV, and power station extensions.

Candidates must be Corporate Members of the Institution of Electrical Engineers or hold equivalent qualifications and should not be over 45 years of age.

Salary in scale £1,500-£1,740, plus Inducement Addition of £300, according to qualifications and experience.

ELECTRICAL ENGINEERS, GRADE I

Experience in the design, construction and operation of overhead distribution networks up to 33 kV essential. 132 kV transmission line experience desirable.

Candidates will be expected to take charge of small undertakings with steam or diesel power stations and must be Corporate Members of the Institution of Electrical Engineers or hold equivalent qualifications.

Salary in scale £1,125-£1,449 with Inducement Addition of £270-£300, according to qualifications and experience.

ELECTRICAL ENGINEERS, GRADES II & III (Overhead Mains)

Applicants must have had a sound technical training and long experience in the erection and maintenance of overhead lines and substations up to 33 kV.

Salary in scale £930-£1,074; £1,110-£1,128 with Inducement Addition of £240-£270, according to experience.

POWER STATION CHEMIST

Applicants should have a minimum educational qualification of Higher National Certificate, and also have had practical experience of fuel, oil and water testing as applied to modern power stations. A knowledge of water treatment for medium and high pressure steam plant is also essential.

Salary in scale £1,125-£1,341 plus Inducement Addition of £270-£300, according to qualifications and experience.

The above appointments will be on contract terms of one or two tours of not less than 18 months continuous service each. The posts carry an additional contract allowance of 10 per cent of the basic salary and a lump sum gratuity of 25 per cent of the total emoluments (excluding contract allowance) at the conclusion of the contract. An outfit allowance of £60 is payable on appointment.

First class passages are provided with special passage arrangements and allowances for the officer's wife and up to two children.

Quarters with hard furnishings will be provided at a low rental.

Further particulars and application forms may be obtained on request from the Electricity Corporation of Nigeria, Nigeria House, 9, Northumberland Avenue, London, W.C.2.

Completed application forms should be returned not later than 15th June, 1958.

This is an amended advertisement and previous applicants need not submit fresh applications. 3480

SOUTHERN ELECTRICITY BOARD

District Commercial Engineer

Southampton District of No. 4 (Bournemouth) Sub-Area. Salary N.J.B. Class G, Grade 4 (£1,160 × £25 to £1,235 per annum). N.J.B. conditions of service.

Applicants must have had considerable experience on the commercial side of the electricity supply industry. They should possess a good knowledge of tariffs, sales, commercial statistics, electrical contracting and all aspects of consumer service.

Applications on forms obtainable from the Sub-Area Secretary, 1, Priory Road, Bournemouth, and returned to him, quoting Z.907, in envelopes suitably endorsed, not later than 2nd June, 1958.

Third Assistant Engineer (Planning and Development)

No. 1 (Southall) Sub-Area Engineering Department, located at Waterloo Road, Uxbridge. Salary N.J.B. Class L, Grade 10 (£1,045 per annum, inclusive of London allowance, rising to £1,105 per annum). N.J.B. conditions of service.

The duties of the post will be to assist in the planning of H.V. and L.V. networks, including system load flow and short-circuit calculations.

Applications on forms obtainable from the Sub-Area Secretary, 2/6, Windmill Lane, Southall, Middlesex, and returned to him, quoting Z.911, in envelopes suitably endorsed, not later than 2nd June, 1958.

General Assistant Engineer

Southampton District of No. 4 (Bournemouth) Sub-Area. Salary N.J.B. Class G, Grade 12 (£685 × £15 to £730 per annum). N.J.B. conditions of service.

Applicants should have had experience in the design, construction, operation and maintenance of H.V. and L.V. overhead and underground distribution systems. The possession of suitable technical qualifications would be an advantage. The successful candidate will be required to carry out standby duties if and when called upon to do so.

Applications on forms obtainable from the Sub-Area Secretary, 1, Priory Road, Bournemouth, and returned to him, quoting Z.908, in envelopes suitably endorsed, not later than 2nd June, 1958.

The successful candidates for the above appointments will be required to contribute to the Electricity Supply (Staff) Superannuation Scheme, if eligible. 3548

LAURENCE, SCOTT & ELECTROMOTORS LTD.

invite applications for vacancies at their Manchester works for

DETAIL DRAUGHTSMEN.

Good prospects for suitable applicants to establish themselves with a progressive company on interesting and varied work. Pension scheme in operation.

Apply:
CHIEF DRAUGHTSMAN,
L.S.E. LTD., MANCHESTER, 11.
3558

LONDON ELECTRICITY BOARD

Demonstrator (Female)

APPLICATIONS are invited for the above position in the Board's North Western District, based initially at Willesden, N.W.2.

Applicants should be suitably qualified, holding the E.A.W. or other approved certificate including electrical housecraft, and having experience in conducting demonstrations at service centres and in general service centre duties. They should also be experienced in advising consumers on the selection and use of domestic appliances, both at the service centre and on consumers' premises.

The post is graded within the National Joint Council Agreement (Administrative and Clerical Grades) as Grade 1, i.e. £500 to £600 per annum, plus the appropriate London area allowance.

Application forms obtainable from Personnel Officer, 46, New Broad St., London, E.C.2, to be returned completed by 7th June, 1958. Please quote ref. PER/2465/R. 3550

AIR MINISTRY

STATION ENGINEERS (G.D.) and STATION ENGINEERS (Mech.) required at R.A.F. and M.T.C.A. Stations. Qualifications required: (a) O.N.C. Elec. or Mech. or equivalent; (b) recognised apprenticeship in electrical or mechanical engineering with firm or establishment of good repute; (c) 3 years' employment in electrical or mechanical engineering, preferably on operation and maintenance of mine, factory or workshops plant and services. Preference given to candidates with supervisory experience subsequent to (b) and (c). Work consists of installation, operation and maintenance of high and medium voltage electrical distribution system electrical installation, generating plant, steam and hot water heating systems and miscellaneous works plant, tools and equipment.

Commencing salary according to age, qualifications and experience on range £655-£820. Appointments non-pensionable. Liability for tours of duty overseas for which special allowance payable in addition to higher salary.

Applications from natural-born British subjects only, up to age 40 years.

Write giving age, full details of qualifications and experience, quoting PE.3140-1, to Manager, Ministry of Labour and National Service, Professional and Executive Register, Atlantic House, Farringdon Street, London, E.C.4. Only candidates selected for interview will be advised.

248

CENTRAL ELECTRICITY GENERATING BOARD

East Midlands Division

APPLICATIONS are invited for the following appointments in this Division :—

DEPUTY STATION SUPERINTENDENT, COVENTRY POWER STATION (Vacancy No. 77/58/ER).

Applicants should be suitably qualified engineers, have had a sound general education and technical knowledge in mechanical and electrical engineering, and good experience in the operation and maintenance of steam generating plant.

Salary will be in accordance with Class G, Grade 3 (£1,235-£1,325 per annum) of the National Joint Board Agreement.

Closing date for receipt of applications, 30th May, 1958.

GENERAL ASSISTANT ENGINEER, AVON POWER STATION, WARWICK (Vacancy No. 78/58/ER).

A General Assistant Engineer is required at Avon Power Station, Warwick, where the suitable applicant will be given the opportunity to obtain operating and maintenance experience at this power station.

Applicants should be in possession of suitable engineering qualifications.

Salary will be within the range £540-£635 per annum in accordance with the National Joint Board Agreement.

Closing date for receipt of applications, 28th May, 1958.

SECOND ASSISTANT ENGINEER (Electrical), GENERATION (Construction) DEPT. DIVISIONAL HEADQUARTERS (Vacancy No. 79/58/ER).

Preference will be given to applicants who hold a degree in Electrical Engineering, are Corporate Members of the Institution of Electrical Engineers, or possess other equivalent qualifications.

They should have had experience in the design and installation of switchgear, transformers and cables up to 33 kV, and other electrical equipment associated with modern power stations.

Experience in the preparation of specifications and estimates and preparing reports on tenders will be a recommendation.

Salary will be within Class AX/EX, Grade 4 (£1,145-£1,410 per annum) of the National Joint Board Agreement.

Closing date for receipt of applications, 28th May, 1958.

SHIFT CHARGE ENGINEER, CASTLE DONINGTON POWER STATION (Vacancy No. 80/58/ER).

Applicants should have had operating experience with high-pressure turbo-alternators and pulverised fuel-fired boilers.

Possession of technical qualifications admitting to Corporate Membership of the Institution of Mechanical and/or Electrical Engineers and also proof of indentured apprenticeship will be an advantage.

Salary will be in accordance with Class L, Grade 7 (£1,235-£1,325 per annum) of the National Joint Board Agreement, plus 10% allowance for shift duties.

Closing date for receipt of applications, 28th May, 1958.

FOURTH ASSISTANT ENGINEER, STAYTHORPE TRANSMISSION SECTION (Vacancy No. 81/58/ER).

Applicants should have experience of the maintenance and operation of E.H.T. overhead lines, transformer and switchgear.

Preference will be given to candidates with qualifications leading to Corporate Membership of the Institution of Electrical Engineers.

Salary will be in accordance with Class AX/EX, Grade 8 (£710-£935 per annum) of the National Joint Board Agreement.

Closing date for receipt of applications, 4th June, 1958.

These appointments will be pensionable under the terms of the Electricity Supply (Staff) Superannuation Scheme.

Applications should be submitted on the official form AE6/ACT, which may be obtained from the Divisional Establishments Officer, Central Electricity Generating Board, East Midlands Division, P.O. Box 25, Barker Gate, Nottingham, and should be returned to the undersigned by the date stated. PLEASE QUOTE VACANCY NUMBER.

L. F. JEFFREY,
Divisional Controller.

14th May, 1958. 3528

INSTRUMENT ENGINEER

experienced in electronic and mechanical instrumentation required by

ENGLISH ELECTRIC
RUGBY.

Successful applicant will be required to plan, supervise installations, and when necessary service recording equipment in power station installations, and will act under the direction of the Chief Mechanical Erection Engineer.

The appointment offers considerable interest and opportunities for travel.

Write giving details, etc., to—

Dept. C.P.S.

336/7, Strand, London, W.C.2

quoting Ref. ER.1112B.

3500

CENTRAL ELECTRICITY GENERATING BOARD

SENIOR and ENGINEERING DRAUGHTSMEN required by the Southern Projects Group of the Central Electricity Generating Board.

Superannuation scheme. Salary N.J.B. Schedule D, Grade 5, £760-£860 or Grade 6, £595-£715.

Applicants should preferably have had experience in the layout and diagrams for electrical plant in power stations.

Employment will in the first instance be at Bristol and after a period of approximately two years the successful candidates will transfer to North London. Assistance will be given in connection with this transfer.

Applications on form A.E.6/ACT obtainable from the Divisional Secretary, South Western Division, 26, Oakfield Road, Bristol, 8, should be completed and returned by 30th May, 1958.

3553

CENTRAL ELECTRICITY GENERATING BOARD

Southern Division

APPLICATIONS are invited for the following vacancies:—

FITTERS (Electrical). Applicants should have served an indentured apprenticeship. Rate of pay 4s. 11½d. per hour.

Applications giving full details of experience and posts held should reach the Section Engineer, Mansfield House, Chandler's Hill, Iver Heath, Bucks, by 30th May. 3582

ELECTRICAL ENGINEERING IN INDUSTRY

MICHELIN TYRE CO. LTD.

wishes to contact ELECTRICAL DESIGNER - DRAUGHTSMEN who are particularly anxious to avoid too early specialisation within their profession.

Progressive posts are offered which will give the selected candidates comprehensive experience in the application of electrical engineering to industrial processes.

The Electrical Engineer is rapidly becoming a dominant factor in process work, and electrical technology plays a role of ever-increasing importance in the tyre manufacturing industry.

Examples of the MANY FACETS OF ELECTRICAL WORK which present themselves in our organisation are :—

1. Motor and control gear applications, A.C. and D.C.
2. E.H.T. and L.T. distribution and cable work.
3. Lighting schemes.
4. Substation design and layout.
5. E.H.T. and L.T. oil and air break switchgear.

Our development drawing office provides the link between the specialist manufacturer of electrical gear and the production process technologist.

If you

1. have served an apprenticeship in electrical engineering, craft or student,
2. have had good design experience in two or more aspects of the aforementioned list of subjects,
3. possess a Higher National Certificate in Electrical Engineering or above,
4. are at least 25 years of age, and
5. wish to broaden your experience and at the same time maintain continuity of service with a company of international repute,

please write for application form and further particulars to :—

Department SP/A
MICHELIN TYRE CO. LTD.
Stoke-on-Trent, Staffs

quoting reference B/ES/558

3565

MUIRHEAD & CO. LIMITED

Beckenham, Kent

ELECTRONIC TEST ENGINEER required with H.N.C. or equivalent for testing of facsimile and picture telegraph instruments.

This is a staff appointment with ideal working conditions. Salary commensurate with qualifications and experience. A pension scheme is in operation and the company has its own sports ground.

Written applications giving full particulars should be addressed to the

Personnel Manager 3519

Situations Vacant (continued)

YORKSHIRE ELECTRICITY BOARD

No. 1 (Bradford) Sub-Area

BRADFORD DISTRICT

THIRD ASSISTANT DISTRICT ENGINEER.

Applicants should have passed the Graduateship Examination of the Institution of Electrical Engineers or hold recognised equivalent technical qualifications, have substantial experience in construction, operation and maintenance of high-voltage systems, underground cables and overhead lines and substations, and medium and low voltage networks, preferably including direct current systems.

Candidates must be prepared to reside in the district and undertake standby duties, if required.

Salary N.J.B. Class J, Grade 9, £935/£20/£995 per annum.

Applications, giving full details of age, qualifications and experience, together with the names of two referees, should be forwarded to the Manager, No. 1 (Bradford) Sub-Area, Yorkshire Electricity Board, 45/53, Sunbridge Road, Bradford, not later than 6th June, 1958.

No. 7 (Grimsby) Sub-Area

GAINSBOROUGH DISTRICT

SECOND ASSISTANT DISTRICT ENGINEER.

Applicants should preferably be Corporate Members of the Institution of Electrical Engineers or hold equivalent qualifications. They should have had a sound training and extensive experience in the design, construction, operation and maintenance of H.V. and L.V. underground and overhead distribution systems, substation plant and ancillary equipment, particularly in rural areas.

Salary N.J.B. Class E, Grade 7, £835/£15/£880 per annum.

THIRD ASSISTANT DISTRICT ENGINEER.

Applicants should be of Higher National Certificate standard in electrical engineering and have experience in the design, construction, operation and maintenance of H.V. and L.V. overhead and underground distribution systems, substation plant and ancillary equipment.

Salary N.J.B. Class E, Grade 9, £740/£15/£785 per annum.

Applications, giving full details of age, qualifications and experience, together with the names of two referees, should be forwarded to the Manager, No. 7 (Grimsby) Sub-Area, Yorkshire Electricity Board, Moss Road, Grimsby, not later than 6th June, 1958. 3551

NOTTINGHAM AND DISTRICT TECHNICAL COLLEGE

Shakespeare Street, Nottingham

Principal:
D. A. R. Clark, M.Sc.(Tech.), M.I.Mech.E.

APPLICATIONS are invited for the following full-time appointment :—

ASSISTANT GRADE B IN ELECTRICAL ENGINEERING—LIGHT CURRENT.

A large new building comes into use in September next for well-equipped departments of Building and Civil Engineering, Electrical Engineering, Chemistry, Physics and Mathematics, and Mining. Increased accommodation is also available to the Departments of Mechanical Engineering, Arts and Commerce, Printing and Textiles. Research work by both staff and students is being rapidly developed.

Experience in industry, teaching and/or research desirable.

Salary in accordance with the Burnham Technical Scale as follows: £650 × £25 to £1,025 per annum. Additions for Assistants include degree allowance of £75 per annum (or £125 for good honours degree), up to 3 increments of £25 for training in approved cases and incremental allowance for industrial experience after age 21, and war service.

Further particulars and form of application may be obtained from the Principal, to whom completed forms should be returned not later than 6th June, 1958. 3580

ASSISTANT ELECTRICAL ENGINEER

ELECTRIC motor control gear manufacturers require young Assistant in Design Office with knowledge of electronics. Progressive position, contributory pension scheme.—Box 3568.

EASTERN ELECTRICITY BOARD

APPLICATIONS are invited for the following appointments. The successful candidates will be required to contribute to a superannuation scheme and may be required to undergo a medical examination.

Area Headquarters

SENIOR ASSISTANT, CHIEF COMMERCIAL OFFICER'S DEPARTMENT (55/58.N.).

Applicants should be experienced in the design, construction, application and purchase of window displays, display materials, exhibition stands, etc., and have a sound general knowledge of the preparation and use of all advertising material.

Knowledge of modern design, decoration and layout of electricity showrooms would be an advantage.

The successful applicant will be required to assist and advise, through the Board's six Sub-Areas, on window and interior display at over 150 service centres.

Salary N.J.C. Grade 6 (£945-£1,020).

Applications stating age, qualifications and experience to be forwarded to the Chief Commercial Officer, Eastern Electricity Board, Wherstead, Ipswich, within fourteen days.

Northmet Sub-Area

SUB-AREA HEADQUARTERS, SOUTHGATE, London, N.14. TWO ENGINEERING DRAUGHTSMEN (Ref. 759) (57/58.R.).

Candidates should have had experience in the preparation of plans for system extensions and preferably also in overhead line design and surveying.

Salary N.J.B. Schedule D, Grade 6 (£595-£715) plus London allowance.

Apply by letter to S. F. Osborne, M.I.E.E., A.C.I.S., A.M.B.I.M., Manager, Northmet Sub-Area, Eastern Electricity Board, Northmet House, Southgate, London, N.14, by 6th June, 1958.

HERTFORD DISTRICT. FOURTH ASSISTANT ENGINEER (Ref. 787) (56/58.R.).

Candidates should have had a sound technical training and suitable experience in the construction, operation and maintenance of H.V. and L.V. distribution systems including substations.

Salary N.J.B. Class F, Grade 11 (£685-£730).

Apply by letter to W. H. Hatton-Ward, Assoc.I.E.E., Manager, Eastern Electricity Board, Bridgefoot, Ware, Herts, by 6th June, 1958. 3584

JOSEPH LUCAS

(ELECTRICAL) LIMITED

Great King Street, Birmingham, 19

ENGINEER

EXPANSION of development of ignition equipment for gas turbines and allied projects creates a vacancy for a practical engineer with experience of design for economic production of electrical apparatus. The work is of a high technical standard and applicants should preferably possess an honours degree.

The post is permanent and pensionable and offers considerable scope for advancement to a progressive engineer.

Apply in writing stating age, qualifications and experience to the Personnel Manager, Joseph Lucas (Electrical) Ltd., Great King Street, Birmingham, 19, quoting reference PM/D/190.

128

DRAUGHTSMEN

SENIORS and juniors required for design and detail of medium voltage electrical switch and control gear for electricity boards, oil refineries, NC.B. and industrial installations. Men holding or studying for O.N.C. and having D.O. experience in the above class of work preferred.

Excellent working conditions. 5-day week. Contributory superannuation plus free life insurance. Applications treated in strict confidence.

Apply, stating age, qualifications and salary desired, to Secretary, M. & C. Switchgear Ltd., Kirkintilloch, Nr. Glasgow. 3559

CENTRAL ELECTRICITY GENERATING BOARD

Midlands Division

APPLICATIONS are invited for the following positions in the System Operation Department. N.J.B. service conditions, superannuable appointments, salaries within Schedule "B" of the Agreement.

(a) SECOND ASSISTANT ENGINEER (Control), Grade 4, £1,145-£1,410 per annum plus 10% shift allowance. To take charge of Grid System Control Room (on shift basis) and supervise all grid switching and load despatching within the Birmingham Grid Control Area. Considerable power station and system operation experience is necessary. Associate membership of technical institution desirable.
(Vacancy No. 796MD.)

(b) THIRD ASSISTANT ENGINEER, Grade 6, £895-£1,140 per annum, for the preparation of system operation statistics and analyses and evaluation of generation costs. Some experience in power station and system operation practices desirable. Technical education to Higher National Certificate standard.
(VacancyNo. 797MD.)

(c) THIRD ASSISTANT ENGINEER, Grade 6, £895-£1,140 per annum, to assist mainly in co-ordinating the short and long-term outage of transmission equipments. Some experience in power station and system operation practices desirable. Technical education to Higher National Certificate standard.
(Vacancy No. 798MD.)

Apply, quoting the appropriate vacancy number, on form AE6, available from the Establishments Officer, 53, Wake Green Road, Moseley, Birmingham, 13, by 5th June, 1958. 3526

SENIOR DESIGN ENGINEER

INSTRUMENTATION

ENGLISH ELECTRIC
STAFFORD

THE company wishes to appoint a SENIOR DESIGN ENGINEER for the development of light electro-mechanical devices in the field of advanced instrumentation and recording.

A knowledge of servo mechanism, pulse and analogue circuitry and application of semi-conductors is desirable.

This is a senior appointment offering wide scope for a man with initiative and ability.

Tenancy of a company house will be available to the successful applicant if required.

Please write giving full details to—

Dept. C.P.S.
Marconi House, 336/7, Strand, London, W.C.2

quoting Ref. ER.1212N.

3499

ELECTRICAL ENGINEER

A LEADING firm of electrical contractors mainly engaged in heavy industrial power and lighting contracts require GENERAL MANAGER for Branch Office.

This is a new appointment offering considerable scope, and applicants for this post must have sound commercial and practical experience in the contracting field and be capable of obtaining, handling and successfully completing contracts of large magnitude.

Candidates being Corporate Members of I.E.E. or holding an engineering degree will be preferred.

Basic salary £1,750 per annum, rising to £2,500 by means of commission on profits.—Box 3482.

CENTRAL ELECTRICITY GENERATING BOARD

London Division

APPLICATIONS are invited for following superannuable posts. Conditions of service in accordance with N.J.B. Agreement, Schedule A or B. Salary includes London allowance. Qualifications entitling to Graduate Membership of I.E.E. or I.Mech.E. for post (a) and Corporate Membership for posts (b) an advantage.

(b) DEPUTY POWER STATION SUPERINTENDENT, BELVEDERE (Erith) POWER STATION (Vacancy No. 58/347).

Candidates should have had practical experience of large station administration and taking executive responsibility for personnel. Salary Class L, Grade 3 = £1,745/£1,850 p.a.

(b) MAINTENANCE ENGINEER (Electrical), BRUNSWICK WHARF POWER STATION (Vacancy No. 58/348).

Experience necessary in power station electrical plant, including auxiliaries, airbreak switchgear, testing and commissioning of protective equipment, together with character and ability to control staff. Salary Class K, Grade 7 = £1,210 p.a.

(Applicants to Vacancy 58/142, 26.2.58, need not re-apply.)

(a) FOURTH ASSISTANT ENGINEER (Efficiency and Testing), GENERATION (Operation) DEPT. (Vacancy No. 58/349).

Candidates should have had a good technical education and experience in testing and/or operation of power station mechanical plant. The appointment will be initially at the Barking A/B Power Station. Salary Class AX/EX, Grade 8 = £750–£985 p.a.

Applications, quoting vacancy number, to (or on form from) Central Electricity Generating Board, London Division, P.O. Box 136, London, W.1, by 2nd June, 1958. 3527

KUWAIT OIL COMPANY LTD.

requires

INSTRUMENT ENGINEERS

for service in KUWAIT.

Applicants must hold Higher National Certificate in Electrical Engineering and must have completed 5 years' post-apprenticeship experience with a firm of instrument manufacturers, including supervision of overhaul and calibration of electrical, electronic, mechanical, pneumatic and hydraulic measuring and control instruments used in the petroleum industry, and in power plant up to 33 kV. Knowledge of electrical medical equipment an advantage.

Local salary according to qualifications and experience, but not less than £1,725 per annum. Pension scheme; kit allowance.

Write for application form giving brief details, and quoting K.2438, to—Box Z/71, c/o 191, Gresham House, London, E.C.2.

3511

LONDON COUNTY COUNCIL

South-East London Technical College

SEPTEMBER, 1958

GRADE A ASSISTANT, Department of Electrical Engineering, to teach Electrical Engineering and allied subjects. Should be able to qualify as Graduate of Institution of Electrical Engineers or hold equivalent qualifications, and have suitable industrial experience; ability to teach engineering drawing an added qualification.

Burnham F.E. salary scale £475 × £25 to £900 plus additions for training and qualifications if applicable; increments within the scale for experience plus London allowance of either £36 or £48 p.a.

Application forms from Secretary at College, Lewisham Way, London, S.E.4, to be returned by 7th June, 1958. (921) 3510

GHANA PUBLIC SERVICE COMMISSION

APPLICATIONS are invited for the following vacancy in the ELECTRICITY DEPARTMENT :—

TRAINING OFFICER for supervision and instruction of apprentices, advising on training methods and co-ordinating training with staffing requirements; planning and administration of schemes of training; advising on scholarships and further training courses; supervision of training arrangements overseas and supervision of trade tests.

Candidates should be at least 28 years of age; must have served a recognised apprenticeship in mechanical or electrical engineering; have had at least three years' experience in the operation of modern technical training schemes, preferably hold the H.N.C. in Mechanical or Electrical Engineering or the O.N.C. in Mechanical and Electrical Engineering, or similar qualification and possess marked initiative and drive, a highly developed organising sense and the ability to plan ahead. Salary in range £1,380–£1,730 per annum.

Appointment on contract for two tours each of 18-24 months duration. Gratuity at rate of £12 10s. for each completed month of residential service payable on completion of contract. Outfit allowance £30 - £60 on first appointment. Free first class passages for officer, wife and up to 3 children under 18 years, and in addition an education allowance for children when not resident in Ghana of £100 a child for up to 3 children under 18 years. Generous home leave on full pay. Income tax at low local rates. Preservation of superannuation or pension rights, where applicable, can be arranged.

For further particulars and application form write, stating age, qualifications and experience to THE DIRECTOR OF RECRUITMENT, GHANA HIGH COMMISSIONER'S OFFICE, 13, BELGRAVE SQUARE, LONDON, S.W.1. 3512

ADMIRALTY

Royal Naval Scientific Service

Draughtsmen

DRAUGHTSMEN required in Admiralty Research and Development Establishments in London (Teddington area), Portsmouth, Weymouth, and Baldock (Herts), for the design of experimental apparatus needed for fundamental research or for fitting in H.M. ships. Experience is necessary in any of the following classes of equipment: light to medium electrical, electro-mechanical, precision mechanical and electronic.

Candidates must be British, aged 21 years or over, with at least three years' practical workshop training and, preferably, with drawing office experience and possession of the O.N.C. or equivalent.

Appointments unestablished, but opportunities will occur to compete for established posts and for promotion.

Starting pay (London) £550 (age 21), £755 (age 28) scale maximum £870; slightly less in the Provinces.

Apply, stating age, training, experience and qualifications, to Admiralty, Queen Anne's Mansions (Room 809), St. James's Park, London, S.W.1. 250

CENTRAL ELECTRICITY GENERATING BOARD

Midlands Division

STATION SHIFT CONTROL ENGINEERS are required at Meaford "B" Power Station. N.J.B. service conditions, superannuable appointments, salary within Schedule A of the Agreement, Grade J10, £885 to £930 per annum, plus 10% shift allowance.

A sound technical training and practical experience in the control of steam generating plant and main switchgear are required. Appropriate technical qualifications an advantage.

Apply, quoting Vacancy No. 795MD, on form AE6, available from the Establishments Officer, 53, Wake Green Rd., Moseley, Birmingham, 13, by 5th June, 1958. 3525

CITY OF SALISBURY SOUTHERN RHODESIA

Vacancies for Assistant Shift Charge Engineers

APPLICATIONS are invited for the fixed establishment posts of ASSISTANT SHIFT CHARGE ENGINEERS on the grade £1,350 × £50 to £1,500 per annum, commencing salary at the minimum of the grade. No cost of living, shift or other allowances are payable.

Candidates must have completed an approved course of technical education in electrical and mechanical engineering and the possession of appropriate technical qualifications will be an advantage. They must also have had considerable practical experience in the operation of steam power station plant in a responsible position, and experience of control room duties on an interconnected system will be a recommendation.

The appointments are subject to Council's service and leave regulations as amended from time to time and successful applicants will be required to submit satisfactory medical certificates of fitness. They must also be able to comply with the requirements of the immigration authorities.

Applicants who should not be more than 45 years of age, are required to submit full particulars of their technical education, qualifications if any, training and experience, giving details of positions held and salaries received, marital state, age, place of birth and nationality. Copies of not more than three recent testimonials may be included.

Canvassing, directly or indirectly, will be a disqualification.

Further particulars regarding the undertaking, conditions of service, contributions towards travelling and removal expenses, etc., may be obtained from Davis & Soper, Ltd., 52/54, St. Mary Axe, London, E.C.3, to whom applications should be sent to arrive not later than 16th June, 1958. 3560

CENTRAL ELECTRICITY GENERATING BOARD

Eastern Division

APPLICATIONS are invited for the following appointment :—

ASSISTANT MAINTENANCE ENGINEER (Electrical), CLIFF QUAY GENERATING STATION.

Salary Class K, Grade 9, £995 × £20 to £1,055 per annum.

Applicants should have served an apprenticeship, possess suitable technical qualifications, and have had experience in the maintenance of the electrical plant in a modern generating station.

Applications, quoting reference No. 2/9257, stating age, qualifications, experience and present position, should be sent to the Controller, Central Electricity Generating Board, Eastern Division, West Farm Place, Chalk Lane, Cockfosters, Barnet, Herts, by 31st May, 1958.

W. N. C. CLINCH,
Controller. 3539

CENTRAL ELECTRICITY GENERATING BOARD

Eastern Division

APPLICATIONS are invited for the following appointments :—

SHIFT CHARGE ENGINEERS, BRIMSDOWN AND TILBURY GENERATING STATIONS.

Salaries Class K, Grade 7, £1,160 × £25 to £1,235 per annum plus London weighting plus 10% shift allowance.

Applicants should have had good practical and technical training and possess experience in the operation of large generating stations utilising pulverised fuel at high steam pressures.

Applications, quoting reference 2/9267, and stating station, qualifications, experience and present position, should be sent to the Controller, Central Electricity Generating Board, Eastern Division, West Farm Place, Chalk Lane, Cockfosters, Barnet, Herts, to arrive not later than 31st May, 1958.

W. N. C. CLINCH,
Controller. 3538

Situations Vacant (continued)

CITY OF LIVERPOOL EDUCATION COMMITTEE

City College of Technology

Principal: S. A. J. Parsons, B.Sc.(Econ.), M.I.Mech.E., M.I.Prod.E., A.M.B.I.M.

THE Governing Body invite applications from suitably qualified persons for the following appointments (full-time). Duties to commence 1st September, 1958.

(a) SENIOR LECTURER IN ELECTRICAL ENGINEERING.

(b) LECTURER IN ELECTRICAL ENGINEERING.

Salary, Burnham Scale for Teachers in Establishments for Further Education, i.e.: (a) (men) £1,350 × £50 to £1,550; (b) (men) £1,200 × £30 to £1,350 p.a.

Applicants should possess good academic qualifications, and in the case of the Senior Lecturer an honours degree in some branch of electrical engineering is desirable, together with teaching, industrial and/or research experience. Equivalent qualifications will be considered where wide industrial, administrative or research experience could be applied to development in the existing large department and the new College which is under construction. This is an opportunity to return to academic work whilst maintaining industrial contacts and developing research.

Conditions of appointment and application forms (returnable by 30th May, 1958) may be obtained from H. S. Magnay, M.A., Director of Education, 14, Sir Thomas Street, Liverpool, 1.

THOMAS ALKER,
Town Clerk and Clerk to the Local Education Authority.
(J.5174) 3497

WESTINGHOUSE RECTIFIER DIVISION

ELECTRICAL ENGINEERS
are required for the Company's Engineering Dept.
in

CHIPPENHAM, WILTSHIRE,

for the

DESIGN AND DEVELOPMENT OF RECTIFIER EQUIPMENTS.

There are a number of vacancies at various levels and applications are invited from men with Honours Degrees, Pass Degrees and H.N.C.

Previous experience is not essential as training will be given.

The work will be concerned with transformers, transductors, reactances, cooling methods, electronic and magnetic control circuits associated with rectifiers ranging in power from milliwatts to megawatts.

The Company has good amenities and recreational facilities for employees and the factory and engineering departments are situated in a country town.

Selected applicants will be interviewed in London or Chippenham, and will be invited to visit our works.

Send in the first instance to Chief Rectifier Engineer, Westinghouse Brake and Signal Co. Ltd., Engineering Dept., New Road, Chippenham, giving details of your education, qualifications and experience to date and your present salary. If you would like further information beforehand, send to Chief Rectifier Engineer for some of our literature, quoting this advertisement.

WESTINGHOUSE BRAKE AND SIGNAL COMPANY LIMITED, LONDON & CHIPPENHAM.

3561

CENTRAL ELECTRICITY GENERATING BOARD

South Wales Division
(Vacancy No. 54/ER/58)

APPLICATIONS invited for superannuable N.J.B. appointments in the DRAWING OFFICE, GENERATION (CONSTRUCTION) DEPARTMENT, DIVISIONAL HEADQUARTERS.

SENIOR DRAUGHTSMAN (Electrical).
SENIOR DRAUGHTSMAN (Mechanical).
Salary Schedule D, Grade 4, £895 × £20 to £995 or Schedule D, Grade 5, £760 × £20 to £860.

ENGINEERING DRAUGHTSMAN (Electrical).
ENGINEERING DRAUGHTSMAN (Mechanical).
Salary Schedule D, Grade 6, £595 × £20 to £715.

Candidates should be suitably trained, possess an Ordinary or Higher National Certificate and be experienced in one or more classes of plant installed in power or substations, such as:

1. Boilers, conveyors, ash and coal handling, and station auxiliary plant.
2. Turbo alternators, H.P. and L.P. steam and feed pipework, condensing and feed heating systems.
3. Switchgear, transformers, cables, overhead lines; knowledge of protective gear advantageous.

Application forms obtainable from Secretary, South Wales Division, Central Electricity Generating Board, Twyn-y-fedwen Road, Gabalfa, Cardiff, to be returned by 12th June, 1958. 3583

CHIEF DRAUGHTSMAN MOTOR CONTROL GEAR

ESTABLISHED and expanding firm of control gear manufacturers invite applications for the post of

CHIEF DRAUGHTSMAN.

Applicants should have had extensive practical experience in the design, layout and development of multi-motor control boards, particularly as regards equipment built to meet customers' special requirements, and be capable of carrying full responsibility for drawing office output and personnel.

Essential qualities are initiative, ability to organise, and a systematic approach.

Applicants should be between the ages of 30 and 45.

Apply in writing, giving details of age, experience and qualifications, to the Secretary, Morecambe Electrical Equipment Co. Ltd., Westgate Works, Morecambe, Lancs.

3481

MIDLANDS ELECTRICITY BOARD

APPLICATIONS are invited for the following superannuable post:—

North Staffs Sub-Area

SENIOR ASSISTANT
(Education and Training)
(Headquarters).

Duties will include the implementation and administration throughout the Sub-Area of the Board's educational and training schemes for all personnel. Applicants should have had experience of the administration of training schemes and in particular craft and student apprenticeships.

The possession of an appropriate professional qualification or university degree will be considered an advantage.

Salary £945/£1,020 per annum (N.J.C. Grade 6).

Apply by letter, within 14 days, stating age, education, experience, present position and salary, to Mr. H. A. P. Caddell, Sub-Area Manager, Midlands Electricity Board, 234, Victoria Road, Fenton, Stoke-on-Trent.

A. STEPHENS,
Secretary. 3581

SOUTH EASTERN ELECTRICITY BOARD

DISTRICT COMMERCIAL ASSISTANT, Herne Bay/Canterbury District.

Annual salary £690 × £20 to £750 under N.J.C. Grade 3. Superannuable.

Applicants should have experience in dealing with consumers' enquiries, supply matters, tariffs, a sound general knowledge of domestic electrical appliances, agricultural and small commercial supplies; the successful candidate will be required to conduct correspondence and negotiations with consumers.

Applications, naming two referees, to S. J. C. Ellis, A.I.E.E., Joint District Manager, SEEBOARD, 65, Mortimer Street, Herne Bay, Kent, by 4th June, 1958.

LADY DEMONSTRATOR,
Guildford District.

Annual salary £500 × £20 to £600 under N.J.C. Grade 1. Superannuable.

Applicants should possess a recognised diploma or certificate in domestic science, also E.A.W. Certificate.

The successful applicant will be required to conduct lectures and demonstrations, advise consumers and generally assist in the showrooms.

Applications, naming two referees, on forms from W. E. Affleck, M.I.E.E., M.Inst.F., Guildford Manager, SEEBOARD, 99, High Street, Guildford, Surrey, by 4th June, 1958.

GEORGE WRAY,
Secretary. 3549

WARWICKSHIRE COUNTY COUNCIL

Architect's Department

Appointment of Assistant Electrical Engineer

APPLICATIONS are invited for the appointment of an ASSISTANT ELECTRICAL ENGINEER on the special grade £750 × £40 to £1,030). Applicants should possess the Higher National Certificate or be Graduates of the Institution of Electrical Engineers and have had several years' experience in the design of lighting and small power installations.

The appointment is on the established staff and subject to the scheme and conditions of service of the National Joint Council for Local Authorities and also the Local Government Superannuation Acts, 1937-1953. The commencing salary can be within the grade according to ability and experience.

The Council is unable to offer housing accommodation, but consideration will be given to the granting of financial assistance towards removal expenses.

Applications are to be on forms which can be obtained from G. R. Barnsley, F.R.I.B.A., County Architect, Shire Hall, Warwick.

L. EDGAR STEPHENS,
Clerk of the Council.
Shire Hall, Warwick. 3524

MERSEYSIDE AND NORTH WALES ELECTRICITY BOARD

SECTION ENGINEER required at Shotton, in the Wrexham District. Salary within range £935/£995 per annum (N.J.B. G/7).

Applicants should have had experience in the construction and operation of overhead and underground distribution systems, including indoor and outdoor substation equipment. Technical qualifications desirable.

Appointment subject to medical examination. Pension scheme.

Application forms obtainable from the Manager, No. 4 Sub-Area, Electricity House, Rhostyllen, near Wrexham. Closing date 28th May, 1958.

[This is a re-issue of a previous advertisement. Previous applications remain under consideration.] 3530

TECHNICAL SALES REPRESENTATIVE

required for Yeovil and West Country. Generous salary/commission/expenses. Must own car. Pension scheme. 5½-day week. Only applicants with experience, initiative and dynamic personality will be considered. Full details to Managing Director.

BRITISH CENTRAL ELECTRICAL CO. LTD.
6, Rosebery Avenue, London, E.C.1

3586

PORTSMOUTH COLLEGE OF TECHNOLOGY

Department of Electrical Engineering

APPLICATIONS are invited for the following full-time posts :—

2 LECTURERS.
1 ASSISTANT, GRADE B.

Applicants must have a degree or equivalent qualification, industrial experience, and some teaching experience.

Salary scales : Lecturers £1,200 × £30 to £1,350; Assistant Grade B £650 × £25 to £1,025 plus allowance of £75 for graduate or recognised equivalent qualification. Further allowance for training in some cases; increments on scale for approved experience.

Form of application (stamped addressed foolscap envelope) obtainable from the Registrar. 3535

MIDDLESEX COUNTY COUNCIL

APPLICATIONS are invited for a post in A.P.T. III (£875 × £35 (4) × £40 to £1,055 p.a. if 26 years or over) within the Organisation and Methods Division of the Clerk's Department. Officer appointed required to work as member of team engaged on both organisation and methods reviews and staff inspection. Must possess high degree of tact and initiative and be able to apply logical and analytical approach to problems.

Established, subject to medical assessment. Prescribed conditions.

Apply to the Clerk (Ref. C/O & M), Guildhall, Westminster, London, S.W.1, stating age, experience, qualifications, present salary, and giving names of three referees, by 9th June (quote X.506 ER). Canvassing disqualifies. 3537

ELECTRICAL ENGINEER

required for site inspection in the North of England. A.M.I.E.E. or equivalent essential. Preferably experienced in H.T. and L.T. distribution and power and lighting systems. Must be able to specify and evaluate site tests.

Permanent appointment with salary commensurate to responsibility, and comprehensive pension scheme. 5½-day week.

Reply with details of age, qualifications, experience and present salary to the :—

Office Manager
BRITISH OXYGEN WIMPEY LIMITED
17, Monck Street, London, S.W.1
3536

THE GENERAL ELECTRIC COMPANY LIMITED

Witton, Birmingham, 6

requires a

SENIOR DRAUGHTSMAN

with experience of general electronic work and capable of producing layouts and details of power equipments from circuit diagrams and component specifications. Applicants should preferably have the Higher National Certificate.

Please write with full particulars to:—

The Staff Manager.
3562

CENTRAL ELECTRICITY GENERATING BOARD

Midlands Division

STATION SHIFT CONTROL ENGINEER is required at Ocker Hill Power Station, Nr. Birmingham. N.J.B. service conditions, superannuable appointment, salary within Schedule A of the Agreement, Grade G.10, £790 to £835 per annum, plus 10% shift allowance.

A sound technical training and practical experience in the control of steam generating plant and main switchgear are required. Appropriate technical qualifications an advantage.

Apply, quoting Vacancy No. 801MD on form AE6 available from the Establishments Officer, 53, Wake Green Road, Moseley, Birmingham, 13, by 9th June, 1958. 3554

WELSH REGIONAL HOSPITAL BOARD

APPLICATIONS invited for positions as ENGINEERING ASSISTANTS. Applicants, who will be expected to design schemes and prepare specifications for heating, hot water and ventilation or electrical installations under supervision, must possess the Higher National Diploma in Mechanical or Electrical Engineering, or the Higher National Certificate in Mechanical or Electrical Engineering, or a recognised engineering degree, or any other qualification approved by the Minister of Health as of at least equivalent standard.

The salary scale will be £655 (at age 23 or over; £25 shall be deducted for each year below that age) × £25 (4) × £30 (1) × £35 (4) × £40 (1) to £965. The appointment is superannuable and terminable by one month's notice on either side.

Applications stating age, experience, qualifications and present position, together with the names and addresses of two referees, should be addressed to the Secretary, Welsh Regional Hospital Board, Temple of Peace and Health, Cardiff, within 10 days of this advertisement appearing. 3529

CENTRAL ELECTRICITY GENERATING BOARD

South Western Division

FOURTH ASSISTANT ENGINEER required in the Transmission Department at Divisional Headquarters, Bristol.

Superannuation scheme. Salary N.J.B. Class AX/DX, Grade 7, £810-£935/£1,010.

Duties are in relation to the planning and construction of high voltage overhead transmission lines and the supervision of contracts. Technical education to Higher National Certificate is desirable.

Applications on form A.E.6/ACT obtainable from the Divisional Secretary, 26, Oakfield Road, Bristol, 8, should be completed and returned by 30th May, 1958. 3552

AUTOMATIC TRANSMISSION CONTROL

GRADUATE ENGINEER required for work on electrical control systems. This post requires a man who can appreciate the operation of complex inter-connected relay systems and can design optimum circuits to meet new requirements. The work involves not only laboratory design and testing but also full-scale vehicle trials, both in Britain and on the Continent. Appointment in the West London area. Applications to—Box 3498.

THE GENERAL ELECTRIC COMPANY LIMITED

Witton, Birmingham, 6

requires an

ASSISTANT ENGINEER

for the Mechanical Test Section of the Witton Laboratories for work on rig testing, non-destructive testing and mechanical testing of components and assemblies. Some experience of this class of work is desirable but not essential. Minimum qualifications, Higher National Certificate.

Please write with full particulars to:—

The Staff Manager.
3563

AN ELECTRICAL CONTROL GEAR DESIGNER

FIRM of electrical control gear manufacturers require a Design Engineer with experience in automatic and hand-operated control gear and panels. Knowledge of electronics desirable but not essential. Attractive remuneration and conditions.—Box 3567.

ASSISTANT required London electrical contractors. Must have drawing office and estimating experience. Write stating age, experience and salary.—Box 3569.

A MAINTENANCE engineer is required by a leading commercial house established in West Africa. Applicants should not be more than 35 years of age and will be required to supervise the maintenance of a wide variety of tools, including arc, gas and spot welding equipment, electrical alternators and ancillary gear, compressed air and hand tools. In addition, from time to time he will be required to fabricate simple jigs and fixtures. The job covers, therefore, a wide range of subjects and demands a man who has technical skill, an ability to improvise in emergencies, patience and the qualities of leadership which will enable him to train and supervise a small maintenance team. The initial salary depends on qualifications and experience, but will not be less than £1,000 p.a. Subsequent increments will depend on ability. In addition there are family allowances; free furnished accommodation is provided together with free first class passages to and from Africa and free medical attention in Africa. Tours of about 21 months are each followed by substantial leave on full pay. Membership of pension fund. Apply giving details of qualifications and experience to—Box 3540.

A RAPIDLY expanding company requires a really experienced representative for the Yorkshire and Lancashire area, calling on electrical wholesalers, mail order stores, etc. Good salary and prospects for the right man. Car provided.—Box 3532.

A SENIOR electrical engineer, aged between 30-45, is required to take charge of electrical design and development. Experience in design and manufacture of electro-magnetic equipment is essential. Candidates must have enthusiasm, energy and initiative, preferably a degree or equivalent professional qualifications. The salary will be fully commensurate with experience and qualifications. A pension scheme is in operation. This appointment presents an unusual opportunity for the successful candidate to make a progressive career in one of the smaller old-established firms manufacturing a high-grade specialised product well known in the machine tool industry. Please write giving full particulars to — General Manager, J. H. Humphreys and Sons Limited, Werneth, Oldham, and mark the envelope "Electrical Engineer." 3515

ASSISTANT electrical engineer required by steel tube manufacturers in Birmingham. This is an excellent opportunity for a young man who is between the ages of 25 and 32, who has a university degree or its equivalent, and has served a recognised apprenticeship or training for at least 3 years in electrical engineering. The successful applicant will be responsible to the asst. chief engineer for all the electrical maintenance and repairs of a varied plant including a large number of overhead cranes and other lifting appliances. Apply stating age, qualifications, experience and salary required to Personnel Manager, Tubes Limited, Rocky Lane, Aston, Birmingham, 6. 3442

ASSISTANT manager with mechanical/electrical experience to boost production established West London component factory with full order book. Excellent prospects hard worker with ideas and ambition. State age, experience, salary required.—Box 3430.

ASSISTANT to manager of power dept. of important electrical manufacturers. Applicants should preferably be Member of the I.E.E., possess a university degree, and have served an apprenticeship with an engineering firm. General experience of heavy electrical plant and a sound commercial knowledge would also be an advantage. The position offers prospects to a young man under thirty. Write giving personal details, qualifications, experience, age and present remuneration and position to—Box 3572.

CONTROL gear engineer required, age 23-35, for layout and circuiting of contactor equipment. Good salary. Permanent and progressive position. Canteen, pension scheme. Write stating age, experience and qualifications, if any, to Personnel Officer, Dewhurst & Partner Ltd., Inverness Road, Hounslow, Middlesex. 273

DESIGNER-draughtsman, senior, electrical, required. Experience is preferred in the application of diesel-driven generating machinery up to 200 kW and its associated control gear, including portable, standby, automatic mains failure equipment, etc. Experience essential in control gear and circuit layout. Good salary offered. Pension scheme. Canteen facilities. Reply for the attention of the Chief Engineer, Henry Meadows Limited, Fallings Park, Wolverhampton. 3241

***Situations Vacant** (continued)*

DRAUGHTSMEN reqd. with experience in preparation of cable layouts and installations for generating stations, industrial plants and distribution schemes. Write giving full details of experience, qualifications and salary reqd. to Staff Officer, Ref. 744/8, Siemens Edison Swan Ltd., Woolwich, London, S.E.18. 3412

ELECTRICAL contract engineers. Opportunity for two young engineers to join staff of progressive company, one for electrical distribution and allied contracts, and one for internal work. Write giving full details, experience and age.—Box 3496.

ELECTRICAL contractor, London, W.1, offers progressive position to working foreman electrician. Good tradesman, and driving licence essential. Capable of supervising labour and industrial contracts. Details of age, training and experience to—Box 3414.

ELECTRICAL contractors require branch manager in Lancashire. Applicants will be required to obtain enquiries and be completely in charge of contracts. State age and full particulars of previous engagements.—Box 3570.

ELECTRICAL engineer required by N.C.B. Production Dept. in London. Applicants should have experience in design, manufacture and application of such light current engineering equipment as to enable them to advise on all problems associated with intrinsically safe telephone systems, signalling systems, instruments, testing instruments, meters, electronics, etc., as used in the mining industry. Appointment (superannuable) according to qualifications and experience within inclusive range £1,350-£1,964. Write to Staff Dept. (X1146), National Coal Board, Grosvenor Place, London, S.W.1, for application form, which should be returned by 4th June, 1958. 3541

ELECTRICAL engineer wanted, having practical and theoretical knowledge combined with commercial appreciation of electrical industry. Preference given to those possessing Corporate Membership, Institution of Electrical Engineers. Duties will include assessment of requirements and recommendations relative to tenders and contracts and to advise on electrical engineering of diesel-electrical projects and installations together with their costs. Only those who already have had experience with commercial side of electrical industry and qualify as above should apply. This appointment will carry with it a good salary and first-class pension scheme. — Box 3BQ9732, A. K. Advg., 212a, Shaftesbury Avenue, London, W.C.2. 3585

ELECTRICAL installation engineers require supervisor for West Africa. 18 months tour, 3 months' leave. Free accommodation, kit allowance and passage, single man preferred. Apply stating salary required.—Box 3394.

ELECTRICAL maintenance engineer to be responsible to the chief engineer for the maintenance of a medium heavy industrial plant. Minimum qualification H.N.C. or equivalent. Commencing salary in range £900/£1,100 plus pension. Full details to—Box 3502.

ELECTRICAL testers required for work on all types of transformers up to 3,000 kVA. Previous electrical experience and some technical knowledge essential. Apply to the Personnel Officer, Foster Transformers, Ltd., South Wimbledon, London, S.W.19. 3566

ELECTRICIANS required for engineer's department, experienced in general installation, power and maintenance work; experience in power-operated lifts advantageous. Electrical contracting industry N.J.I.C. conditions and a 44-hour week. Applications, in writing only, within 14 days, to — Chief Engineer, King's College Hospital, Denmark Hill, London, S.E.5. 3503

ELECTRO-mechanical draughtsmen required for production drawing office of company engaged in the manufacture of control gear equipment. Good salaries paid to "first-class" men. Canteen facilities, pension scheme. Housing assistance considered in approved cases. Write giving age, experience, etc., to—Personnel Officer, Dewhurst & Partner Ltd., Inverness Works, Inverness Road, Hounslow, Middx. 275

FOREMAN. Electrical manufacturers, East Lancs. Experience of assembly and wiring of control gear necessary. Knowledge of sheet metal work and light machining an advantage. Good disciplinarian required. Assistance with housing.—Box 3444.

J. A. CRABTREE & Co. Ltd., Lincoln Works, Walsall, require senior designers with experience in domestic and industrial electrical accessory development. Applicants should be capable of initiating detail development with a minimum of supervision. Applications stating age, experience and salary required should be addressed to the Technical Director. 3504

MANAGER for electrical repair shop, East Lancs. Must be familiar with all types and sizes, A.C. and D.C. Accommodation available.—Box 3325.

RADIO, T.V. and record buyer required by departmental store. Large turnover. Earnings at least £1,000 p.a. Staff pension scheme. Under-buyer or 1st sales with departmental store experience in above depts. would be considered. Apply in first instance stating age and full details of experience to — General Manager, B. B. Evans & Co. Ltd., 148/162, Kilburn High Road, London, N.W.6. 3542

REPRESENTATIVE required by cable manufacturing company to cover Bucks, Berks, Oxon, Middlesex and West and North-West London. Good salary, commission and expenses for experienced man with good connections. Car provided. Pension scheme. Write stating age and experience to—Box 3516.

REPRESENTATIVE. Sales engineer required in the Yorkshire area by well-known company manufacturing a range of cookers and home appliances. A young man with a connection with the Y.E.B., N.E.E.B., wholesale and retail electrical trade, can make this an excellent career. The possession of a car will be an advantage. Write giving full details of education, training and posts held to Manager.—Box 3431.

SALES engineer (inside) for handling enquiries and orders for electric crane and marine equipment. Excellent working conditions. Good salary and pension scheme. Write stating experience, age and education to—Fuller Electric Ltd., Fulbourne Road, London, E.17. 3571

SALES engineer required for electrical division of company manufacturing generating sets up to 160 kW output. Applicants should have Higher National Certificate in Electrical Engineering or equivalent. The commencing salary will be commensurate with experience and qualifications and there will be ample scope for advancement. Applications will be treated as confidential, and should be made in writing, giving details of age, experience and qualifications, to—Sales Director, Henry Meadows Ltd., Fallings Park, Wolverhampton. 3573

SALES engineer with some experience of electric motors required by large manufacturer for one of their branch offices. Some experience with staff administration desirable. Salary plus bonus based on turnover. Excellent prospects for ambitious man with expanding company.—Box 3574.

SENIOR cable estimator required by Hackbridge Cable Co. Ltd., Hackbridge, Surrey. Must be fully conversant with estimating and design for paper rubber and thermoplastic cables. Pensionable post. Write stating age, experience and salary required. For the attention of the General Sales Manager. 3419

SENIOR engineer required by well-known London electrical contractors. Write giving full particulars.—Box 3505.

SIMPSON, BAKER & Company Limited require an experienced sales representative at their Exeter branch. One interested in training for management would be given preference. Remuneration by salary, commission. Expenses paid. Car provided. Superannuation scheme. Replies to be marked for the personal attention of B. M., 2/4, Smythen Street, Exeter. 3517

SWITCHGEAR manufacturers invite applications for position of technical sales engineers to operate in the Scottish and Midlands areas, preferably resident in Glasgow and Birmingham respectively. Experience of switchgear and trunking systems would be of advantage and with connections in the area. Salary, commission, non-contributory pension scheme, and car provided. Apply Sales Manager.—Box 3543.

TELEPHONE cable engineers. Vacancies exist for overseas contracts for telephone cable engineers experienced in the planning and development of subscribers' network schemes. Also contract engineers to undertake installation of u/g and o/h cable systems. Permanent pensionable staff appointments. Write with full details in confidence, stating age, experience and salary expected in U.K., to Staff Officer, Ref. 744/9, Siemens Edison Swan Ltd., Woolwich, London, S.E.18. 3413

TECHNICAL sales representative urgently required, established South Wales firm, to cover electric motor control gear, instruments, small transformers and ancillary equipment. Preference for person having served recognised apprenticeship. Car driver essential. Remuneration by salary and bonus scheme.—Box 3575.

VACANCY occurs for trained electrical engineer having industrial test bed and winding experience, together with sufficient technical knowledge to make, purchase or redesign suitable equipment to meet industrial enquiries and orders. These relate, for the most part, to rotating electrical machinery, transformers, switchboards, etc. Good salary and opportunity in small progressive firm. Write—Secretary, Fyfe, Wilson & Co. Ltd., Station Works, Bishop's Stortford, Herts. 3576

WELL-known electric winding wire and strip manufacturer requires senior representative with knowledge trade, Birmingham, Midland counties. Write in first instance giving details experience. Own employees have been advised.—Box 3446.

WORKING foremen required by electrical contractors, London, W.C. area. Work mainly London. Good prospects. All London applicants interviewed.—Box 9356.

YOUNG engineer required to take charge of electrical development laboratory. This is a responsible position. Minimum qualification National Certificate (Electrical), knowledge of diesel engines desirable. The successful applicant must be capable of working with the minimum of supervision, be prepared to carry out some practical work, and write technical reports on the work done. When applying please state age, experience and present salary. Applications should be addressed to the Staff Personnel Officer, Quasi-Arc Limited, Bilston, Staffs. 3518

APPOINTMENTS FILLED

Dissatisfaction having so often been expressed that unsuccessful applicants are left in ignorance of the fact that the position applied for has been filled, may we suggest that Advertisers notify us to that effect when they have arrived at a decision? We will then insert a notice free of charge under this heading.

SITUATIONS WANTED

ELECT./mech. engineer, 36 years old, 20 years' general engineering experience, last 13 in East with considerable managerial experience, desires post U.K./overseas where courage, initiative and hard work can provide minimum salary of £1,250 per annum.—Box 9359.

REPRESENTATIVE, resident Bournemouth, seeks post with wholesalers or manufacturers, London, Hampshire and Home Counties. —Box 9370.

SALES manager national company domestic appliances desires change; formerly sales engineer with wide experience, excellent relationship with electrical authorities, dealers, departmental stores, furnishing groups, wholesalers at all levels. All replies will be accepted in confidence and careful consideration given to all propositions. At present based Manchester.—Box 3506.

ARTICLES FOR SALE

ROYAL BOROUGH OF NEW WINDSOR

Surplus Plant

(1) 90-h.p. B.T.H. Slipring Motor, 960 r.p.m., 440 volts, 110 amps., 50 cycles, 3-phase, complete with starter and control switch, all reconditioned.

(2) Identical set in working order.

Both sets can be seen at the Waterworks, Tangier Lane, Eton.

Tenders to be returned to me by noon, Monday, 2nd June, 1958.

J. E. SIDDALL,
Town Clerk.

Municipal Offices,
Kipling Building,
Windsor. 3514

ELECTRIC HOUSE SERVICE METERS

PREPAYMENT and credit, 200/250 v. A.C., 1/p., 50 c., 2½-100 A. Fixed or variable tariff. Reconditioned, fully tested and guaranteed 2 years. Prompt delivery, carriage paid.

ALBERICE METER COMPANY
Fairfax Works, Fairfax Rd., London, N.8
(Tel. MOUntview 7944, 6373) 191

LARGE A.C. MOTORS

3-phase, 50 cycles

Maker.	H.P.	Volts.	R.P.M.
B.T.H.	1820	3.3 kV	368
B.T.H.	1800	400/440	368
MATHER & P.	350	400/440	720
METRO-VICK.	310	400/440	1440
MATHER & P.	300	400/440	720
BRUSH	250	400/440	420
B.T.H.	250	400/440	480
MATHER & P.	200	400/440	960
BROOK	110	400/440	580
BROOK	110	400/440	960
CROM. PARK.	100	400/440	480

THOS. W. WARD LIMITED
Albion Works, Sheffield
Phone 26311 (ex. 347); Grams, Forward.
321

ELECTRICAL EQUIPMENT FOR SALE

NEW ALLEN WEST OIL-IMMERSED CIRCUIT BREAKERS, pedestal type, 25-amp. and 70-amp. sizes, 400/3/50; also ELLISON Bantam 20-amp. ditto.

NEW 25-kW SPARE BULBS for HEWITTIC MERCURY ARC RECTIFIERS, type 100/3. NEW MERCURY ARC RECTIFIERS, input 200-250 v./3/50, output 110 v., 2-wire.

2 NEW 3-ph. TRANSFORMERS, 500 kVA, outdoor type, 6,600/440/250, and 2 ditto, 100 kVA, 3,300/440/250.

All above available at fraction of original cost.

BURLEIGH,
Alpine Works, Empire Way, Wembley, Mdsx.
3520

ELECTRIC MOTORS FOR SALE

150-h.p. Synchronous Motor by E.C.C., 400/440-3-50, 1,000 r.p.m., with control panel.

Four 90-h.p. BRUSH Slipring Motors, 400/440-3-50, 1,460 r.p.m., with o.i. starters.

45-h.p. BROOK S.C. Motor, 440-3-50, 410 r.p.m., with o.i. star delta starter.

Five 200-h.p. E.C.C. 500-volt D.C. Motors, 425 r.p.m., with BROOKHIRST panels.

120-h.p. MET-VICK, 500-volt D.C. Motor, 500/700 r.p.m., with starter.

45-h.p. MET-VICK. 500-volt D.C. Variable Speed Motor, 500/1,000 r.p.m., with starter.

REED BROTHERS (ENGINEERING) LTD.
Replant Works, Woolwich Industrial Estate London, S.E.18
(Telephone: Woolwich 7611/6) 3587

MERSEYSIDE AND NORTH WALES ELECTRICITY BOARD

Disposal of Non-Ferrous Scrap

THE Board invite tenders for the purchase of such Scrap Electric Cable of all types, together with Scrap Copper and Scrap Lead, as may become available for disposal during the current financial year ending the 31st March, 1959.

Forms of tender may be obtained on application to the Purchasing Officer, Electricity House, Love Lane, Pall Mall, Liverpool, 3.

The closing date for receipt of tenders is Saturday, the 14th June, 1958. 3531

AIRCRAFT GENERATORS

30-volt, 200-amp., D.C. shunt fitted spline shaft. Flange mounting. Ideal welding, lighting. £5 10s. each; del. free U.K. Cash with order, money back guarantee. Also pumps, cut-outs, regs., etc., etc. Stamp for list.

WYLLAN EQUIPMENT CO.
Dept. ER.1, 222, Waterloo Road, Manchester, 8
3590

A.A. ELECTRICAL Co. for A.C.-D.C. motors, switchgear, exhaust fans, hoists, reduction gears, new or reconditioned units.—CHI. 5105. 67. Rothschild Rd., London W.4. 5—

BABCOCK & Wilcox water tube boiler will cut down your fuel costs; we can supply from stock. Two 40,000 lb. evap., 220 lb. w.p.: one 25,000 lb. evap., 200 lb. w.p.; 3,000 lb. evap., 400 lb. w.p.; Spencer Bonecourt boiler; also Marine, Cornish vertical, etc.—Burford, Taylor & Co. Ltd., Boiler Specialists, Burtayco House, Church Street, Middlesbrough (Tel. Middlesbrough 2622). 122

A.C. and D.C. motors, generators, from stock.—Service Electric Co. Ltd., Honeypot Lane, Stanmore, Middx. (Edgware 5566/9). 91

A.C. and D.C. 1/- slotmeters. Guaranteed 2 years, 2½-50 amps. From 50/-. Repairs and recalibrations. See Billiard: Tradex Meter Co., Surbiton (Tel. Elmbridge 4487). 169

A.C. service lift. 2 cwt. at 70 ft.p.m., suitable for four floors. 30 ft. travel. Apply—Old Swan Hotel, Harrogate. 9371

ALTERNATORS from ½ to 675kVA in stock, single and three-phase, all voltages and frequencies. Guaranteed. Many unused. Send your requirements.—Fyfe, Wilson & Co. Ltd., Station Works, Bishop's Stortford. 162

ALTERNATORS, generators, 1-100 kVA, all voltages. Specialists—Powerco Ltd., 312, York Rd., London, S.W.18 (VAN. 5234). 147

ALTERNATORS, 3-phase, all sizes in stock from 7 kVA up to 330 kVA.—Britannia Manufacturing Co. Ltd., 20/26, Britannia Walk, London, N.1 (CLErkenwell 5512). 24

BARGAINS in electric motors are always being obtained from A. Cooksley & Co. Ltd., 21/25, Tabernacle Street, London, E.C.2. Stocks include A.C. and D.C. motors, second-hand and new up to 30 h.p. Starters, slide rails and pulleys. Ring Mon. 3355 for your requirements. 50

BILLIARD Meters. 1/-, 6d. or 1d. slot. All time settings. From 140/-. See Quarterly.—Tradex, Surbiton. 170

CABLE, underground, PILC/VIR/LC, ex London stock. Cutting orders same day delivery London area. Send for priced stock lists. — Batt Electrical Co., 6, Dock Street, London, E.1 (Tel. ROYal 5905). 316

CABLE, underground, all types ex stock.—E. M. Tatton Co. Ltd., Kew Bridge, Brentford (EALing 3155/6). 117

CIRCUIT breakers, various sizes in stock, A.C. and D.C., 200 amperes up to 2,000 amperes. Also dynamo and alternator switchboards. — Britannia Manufacturing Co. Ltd., 22/26. Britannia Walk, London, N.1. 26

COIL winder, Nevilles automatic, winds 16-42 s.w.g. wire.—Box 3589.

CONVERTERS and motor-alternators, 24, 110 and 220v. D.C. to 230/1/50 A.C., 125 watts to 6 kVA in stock.—Powerco Ltd., 312, York Rd., London, S.W.18 (VAN. 5234). 150

CRANE motors. Direct current, series wound or compound wound, all voltages. We have large stocks.—Britannia Manufacturing Co. Ltd., 22/26, Britannia Walk, London, N.1. 22

DIESEL generating sets, all sizes to 500 kW. Britannia Mfg. Co. Ltd., Britannia Walk, London, N.1. 16

ELECTRIC motors, generators, control gear, transformers, A.C. and D.C., new and reconditioned; all covered with our usual 12 months' guarantee; large stocks available.—Electropower Co. Ltd., Kingsbury Works, Kingsbury Road, London, N.W.9 (Colindale 4621-2). 42

ELECTRIC motors, dynamos, alternators and motor generator sets of all sizes. We hold one of the largest stocks in England. New and reconditioned, with 12 months' guarantee.—Britannia Manufacturing Co. Ltd., Britannia Walk, London, N.1 (Clerkenwell 5512, 3 lines); also Works and Stores, Chobham, Surrey. 20

ELECTRIC motors, generators, motor generator sets, transformers, switchgear, etc., large comprehensive stock, overhauled and guaranteed. Copy of our Register, "Electrical Surplus," containing thousands of items of electrical plant, sent on request.—R. F. Winder Ltd., Belgrave Electrical Works, Leeds, 2. 54

ELECTRICIANS. Send for details Shaftesbury lightweight "Bantam" ladders. Top sections fitted with patent moulded rubber blocks, eliminate possibility of scratching or marking walls, fascias, and other painted or highly polished surfaces. Also available for immediate delivery, steps, platform steps, trestles, telescopic trestles, pole and builders-type ladders, and all sizes of two and three-section extension ladders.—Shaftesbury Ladders Ltd. (E.R.), 453, Katherine Road, London, E.7 (Phone: Grangewood 3363/4). 111

FLAMEPROOF switchgear, lighting fittings, conduit fittings, motors, etc., always in stock. —Leighton Warehouse Co., 6, Church Road, Linslade, Leighton Buzzard, Beds. (Tel. No. L.B. 2400). 9341

FOR disposal, 1,963 green outside, white inside, vitreous enamel, tungsten lamp, dispersive, overlamp reflectors, complete with porcelain lampholders. These are all new and further information can be obtained by application to—Crompton Parkinson (Doncaster) Ltd., Wheatley, Doncaster (Mr. Cowing). 3507

FLUORESCENT fittings, lamps, starters and control gear for home and export. Fully guaranteed by actual manufacturers. Send for catalogues. — The Anglo-American Electrical Company, Olive Street, Bury, Lancs. 245

FLUORESCENT tubes reconditioned and guaranteed as new for 7s. 6d. each. Free collection and delivery in Lancs and Yorks.—The Anglo-American Electrical Company, Bury New Road, Breightmet, Bolton, Lancs. (Telephone, Bolton 7251). 212

FRACTIONAL h.p. motors, new, ex stock, A.C./D.C., Universal, B.T.H., Delco-Remy, G.E.C., Fracmo, Newman, Scophony. — Jeary Electrical Co. Ltd., 5, Lamb's Buildings, London, E.C.1. 126

FREQUENCY changers and variable frequency M/A sets in stock, and to specification.—Powerco Ltd., 312, York Rd., London, S.W.18 (VAN. 5234). 148

GENERATING plants of all types, new and reconditioned up to 100 kVA in stock. Special plants built to order at short notice; automatic mains failure, etc.—Powerco Ltd., 312, York Rd., London S.W.18 (VAN. 5234). 151

GENERATING sets for sale, petrol, diesel and steam, from 1 kW up to 700 kW. A.C. and D.C. switchboards.—Fyfe, Wilson & Co. Ltd., Station Works, Bishop's Stortford. 163

HIGH frequency alternators and converters, 400 to 2,600 cycles up to 6 kVA in stock. Powerco Ltd., 312, York Rd., London, S.W.18 (VAN. 5234). 149

HOUSE service meters, C. & H., Aron, E.A.C., 20-240 v. A.C., s.-ph., 50 c., 5 amps., 17s. 6d.; 1s. 6d. postage.—Universal Electrical, 217-221, City Rd., London, E.C.1. 37

MERCURY. We supply clean mercury (lab. grade) for commercial and industrial use. Price 25s. lb. All distilled grades stocked. Generous allowance for dirty mercury. We also buy scrap platinum, gold, silver (in any form) at top market prices. — Belgrave Ltd. (E.R.), 5, Belgrave Gdns., London, N.W.8 (MAI. 7513). 3432

MOTOR generator sets and converters, all sizes and voltages from ½ kW up to 500 kW in stock. — Britannia Manufacturing Co. Ltd., 22-26, Britannia Walk, City Road, London, N.1 (Tel. Clerkenwell 5512, 5513 & 5514). 12

MOTOR generators of all types in stock and to specification up to approx. 100 kW.—Powerco Ltd., 312, York Rd., London, S.W.18 (VAN. 5234). 152

MOTORS, starters, circuit breakers. Huge stocks of all types, ½ to 300 h.p. Stock list or quote by return.—J. S. Ramsbottom & Co. Ltd., Bow St., Keighley (3774-5-6). 70

NAMEPLATES, engraving, diesinking, stencils. — Stilwell & Sons Ltd., 153, Far Gosford Street, Coventry. 108

PHASE converters, single to three-phase, several sizes in stock up to 90 h.p., 3-phase loading. — Britannia Mfg. Co. Ltd., Britannia Walk, London, N.1. 29

PLATING dynamos and motor generator sets, various sizes from 500 amps. up to 2,000 amps., with A.C. or D.C. motors.—Britannia Manufacturing Co. Ltd., 22/26, Britannia Walk, London, N.1. 15

POLYPHASE kilowatt hour meters. Available from stock.—Universal Electrical, 221, City Road, London, E.C.1. 40

PREPAYMENT 1s. slot house service meters. —Universal Electrical, 217-221, City Road, London, E.C.1. 36

PURLEY chokes and ballasts. Our 80-w. tapped h.p.f. ballast with starter switchholder incorporated is proving itself the most popular unit. Suitable for most fittings. 57s. 6d. each subject. — F. W. Blanshard Ltd. (Dept. ER), Purley, Surrey (Uplands 4818/9). 52

QUARTERLY Credit Meters, single & polyphase, 2½-100 amps. From 17/6d. Also D.C. See Television.—Tradex, Surbiton. 171

ROTARY converters in stock, all sizes; enquiries invited. — Universal Electrical, 221, City Road, London, E.C.1. 34

SLYDLOK fuses for sale.—Ryness Supplies, 37, Goodge Street, London, W.1. 284

SMALL BR screws and nuts in steel, brass and stainless steel, from stock. — Premier Screws & Repetition Co. Ltd., Woodgate, Leicester. 180

TWO nearly new 350/400-kVA condensing geared steam turbo sets, 150/200 lb. pressure, stainless blading, self-contained condensers, 400 volts, 3-phase, 50 cycles, and control equipment. Standby sets, never put into commission.—Box 3588.

Articles for Sale (continued)

TELEVISION slotmeters & Time Switches. Details from: Tradex Meter Co., Surbiton. Elmbridge 4487. 172

TWO Young's "Tower" welding sets, 240 v., 4-5 kVA, 50/150 amps., £25 ea.—W. Steel & Co. Ltd., Palmers Road, London, E.2. 3369

VENNER time switches, 200-240 v. A.C./D.C., 10-50 amps., from stock.—Universal Electrical Co., 221, City Rd., London, E.C.1. 38

WARD Leonard motor generating sets, all sizes.—Britannia Manufacturing Co. Ltd., 22-26, Britannia Walk, London, N.1 (Tel. Clerkenwell 5512). 10

WELDING transformer by English Electric, 36 kVA, type FWC600.—Thomas Mitchell & Sons Limited, Bolton. 3452

18-b.h.p. slipring motor, 400/3/50, 2,920 r.p.m., 27 amps., complete with automatic starter. Removed from service and in good order. Enquiries and offers to—Secretary, Barrow Co-operative Society Ltd., Rossall House, Abbey Road, Barrow-in-Furness. 9369

100-h.p. Igranic 220/250-volt D.C. contactor starter with speed regulator, manufactured 1952. £100.—Electric Machinery Co. Ltd., New Union Works, Ancoats, Manchester. 3545

110-volt electrical system, 15-h.p. Turner diesel, 6-kW dynamo, switchboard self starter and 54-cell storage battery. What offers? — Stone House, Rogate, Petersfield, Hants (Rogate 60). 3449

162.5-kVA Paxman diesel alternator, 200 b.h.p., 1,000 r.p.m. Year 1956. Enquiries to—Box 3577.

329-kVA alternator by English Electric, 3/50/400 volts, 1,000 revs., single bearing machine suitable for direct coupling.—Thomas Mitchell & Sons Ltd., Bolton. 3451

400-cycle to 1,500-cycle motor alternators and alternators.—Britannia Mfg. Co. Ltd., Britannia Walk, London, N.1. 27

450-kVA diesel alternator installation, 415/3/50, 500-h.p. M.W.M. diesel engine. Compressor start. Comprehensive control gear and equipment. Had maintenance runs only.—Box 3489.

500-kVA, 3-bearing alternator by Crompton Parkinson; 3/50/415 volts, 700 amps. per phase, 600 revs.; on cast iron bed about 10ft. 6in. × 6ft., with rope pulley and control panel, new 1952.—Thomas Mitchell & Sons Limited, Bolton. 3450

SALES BY AUCTION

Thirty-third Sale **E. R.**

By Order of the Secretary of State for Air

No. 25 MAINTENANCE UNIT, ROYAL AIR FORCE, HARTLEBURY, WORCESTERSHIRE
(4 miles from Kidderminster, 11 miles from Worcester).

NOCK & JOSELAND

are instructed to Sell by Auction at the above Unit on

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a Large Quantity of Valuable

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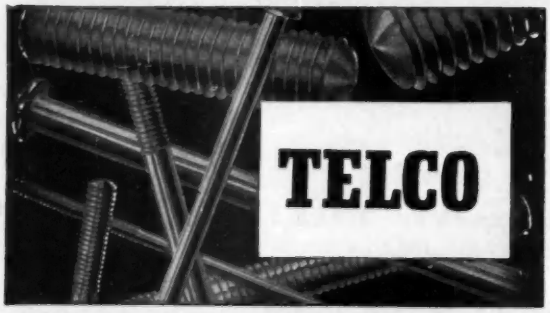

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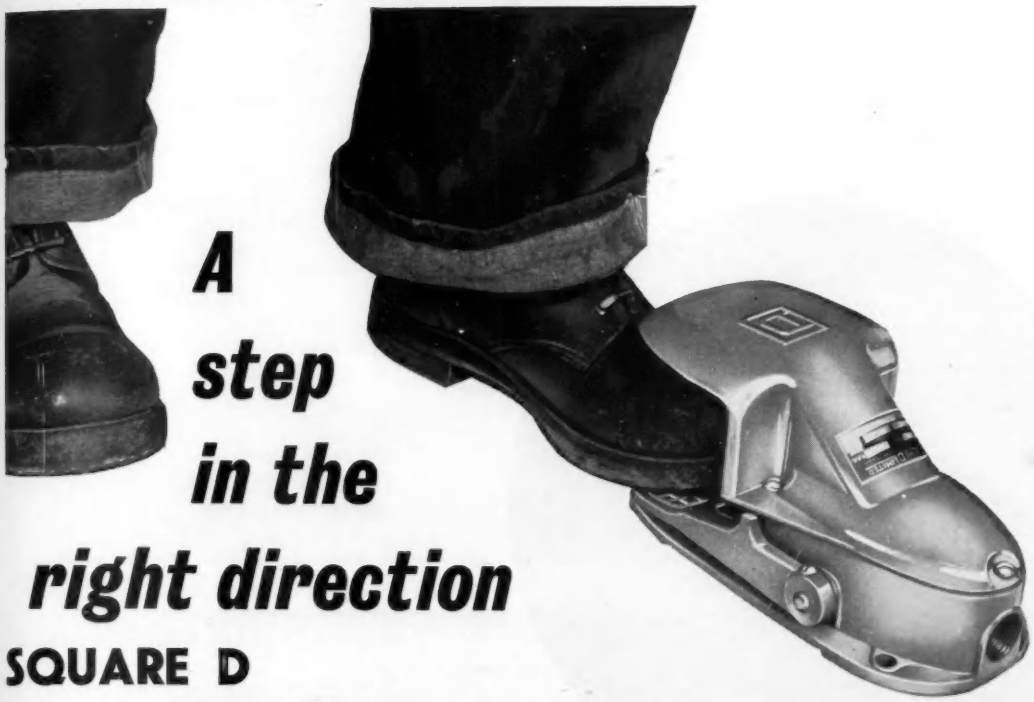

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